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OUTLINES

OF

MILITARY SURGERY.

FIFTH EDITION.

OUTLINES

OF

MILITARY SURGERY.

3744.1 A.

BY

SIR GEORGE BALLINGALL, M.D., F.R.S.E.

SURGEON TO THE QUEEN, AND TO H.R.H. THE DUCHESS OF KENT;
REGIUS PROFESSOR OF MILITARY SURGERY IN THE UNIVERSITY;
FELLOW OF THE ROYAL COLLEGE OF SURGEONS; CONSULTING SURGEON TO THE ROYAL INFIRMARY, AND TO THE LOCK HOSPITAL OF EDINBURGH.

Fifth Edition.

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EDINBURGH:
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TO THE

PRESIDENT AND FELLOWS

OF THE

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

GENTLEMEN,

Six and twenty years have elapsed since the course of Military Surgery was first introduced provisionally into your curriculum, and it is more than twenty years since the first edition of this work was laid before you; at a time when the Chair of the College was occupied by Dr. Campbell, one of the earliest and most esteemed of my professional friends.

Since that period, a Lectureship on Military Surgery has been established in the Medical School of Ireland. This course has been introduced provisionally into the programme of study prescribed by several of the licensing bodies, as well as by the Medical Departments of the Army, the Navy, and the Ordnance, and recommended by the Board of Examiners for the Medical Service of the Honourable East India Company.

This extensive recognition of a course of study, formerly unknown in the schools of this kingdom, and to the improvement of which I have devoted my best energies for upwards of thirty years, while it cannot fail to be gratifying to me, will, I trust, tend to prove that the encouragement which you were the first to give to my early and immature efforts has not been misplaced.

I have the honour to be,

GENTLEMEN,

Your most obedient humble Servant,

GEO. BALLINGALL.

EDINBURGH, *July* 1855.

PREFACE.

The following pages contain a full Outline of the Lectures which have been delivered to the Class of Military Surgery in this University for the last three-and-thirty years. The arrangement which I have followed in teaching this department of medical science is one altogether arbitrary; and without presuming to think that this, the first attempt, approaches to any thing like perfection, I may be permitted to say, that it is an arrangement, which I have found satisfactory and convenient, in conducting the business of my course.

The first division of this course embraces numerous topics connected with the formation, discipline, and economy of armies, which, although not exclusively of a professional nature, are yet highly important to the health of the soldier. The second comprises those surgical accidents and diseases peculiarly incident to military and naval men; and to which the nature of their profession exposes them

in all quarters of the world. The third division embraces the consideration of the most important diseases incident to our troops on foreign stations, and in tropical climates; and of those semblances of disease which the military and naval surgeon frequently finds it more difficult to combat than the reality.

By this arrangement I have been enabled to throw into the introductory and concluding divisions of the course, the discussion of those subjects which require least demonstration, upon which I have expressed myself at length in former publications, and which I have therefore been enabled to treat more briefly in these Outlines.

With reference to the surgical division of this work, which has, I am aware, been thought by some to occupy a disproportionate extent, I would observe that, under existing circumstances, courses of Military Surgery are chiefly patronised as a substitute for part of the surgical attendance enjoined by the several colleges; and hence I feel myself bound, in justice to my pupils, to enlarge upon the Surgical Department.

Again, I find that this is the department which proves most interesting to that important part of my audience, consisting of gentlemen returning from foreign service to refresh their memories, or to renovate their knowledge at the schools of medicine; and in a work of this kind, intended to serve in some degree as a manual for the army surgeon, there is less need of extended detail with

regard to diseases which are every day presented to his observation, and constantly under treatment, than with regard to those accidents which, from their less frequent occurrence, he is apt to lose sight of. Without being at all disposed to underrate the importance of those diseases more strictly within the province of the physician, I have seen reason to fear, that in a long protracted period of general peace, there is some risk of the medical officers of the army overlooking the importance of the surgical department of their profession.

Since the earlier editions of this work were published, I have enjoyed various facilities for its improvement; and after more than thirty years' labour in the Chair of Military Surgery, I find myself in a position to do something like justice to my own conceptions of its duties. Besides the numerous hospitals and medical schools in our own country which I have had occasion to see, I have now repeatedly visited the Parisian Hospitals, which I had formerly seen to great disadvantage when present with the army in that capital in 1815. I have also visited the Military Hospitals in Prussia, in Austria, in Belgium, and in Egypt, and have procured the Codes of Regulations for the Medical Departments of the Continental armies. For those of the Prussian service I am indebted to the courtesy of the Earl of Westmoreland, formerly the British ambassador at Berlin, and for those of the Austrian army, to Dr. Hager of Vienna.

By the liberality of my brethren in the Senatus

Academicus, I have been put in possession of the very interesting and unique series of preparations made by Mr. Alcock, during the service of the British Legion of Spain. In addition to these, Mr. Alcock very handsomely presented to the University, for the use of the Class of Military Surgery, many valuable manuscripts and drawings of surgical subjects, and has recently presented me with an additional portfolio of professional sketches—the whole affording proofs of singular energy, intelligence, and talent, particularly considering the circumstances under which this collection was formed.

To my learned and respected predecessor, Dr. Thomson, I feel greatly indebted for an extensive series of sketches of the wounded at Waterloo, made on the spot by himself and Dr. Somerville. A selection of lithographic prints from these, with short notes of the cases, would form a publication of peculiar interest to many officers, both Medical and Military, the survivors of that eventful day. Such a publication I have often contemplated; but my intentions have, for the present, been frustrated by the absence of my son, employed in the service of the East India Company, whom I wished to execute the necessary drawings. I trust, however, that this subject will not be lost sight of, and in this expectation I have bequeathed these valuable sketches to my successors in office.

It were altogether impossible for me to enumerate the many officers in the public service to whom I have, from time to time, been indebted for communi-

cations which have, I trust, enabled me to improve this Outline of my course in successive editions. Upon former occasions I have most cordially expressed my obligations to the late Dr. Marshall for a very careful revision of the section on the Distribution of the British Troops, and the Rates of Mortality on Foreign Stations. In revising this section, I have also had the able assistance of Dr. Wise of the Bengal Medical Service, to whom I am indebted for corrections of the geographical position and ranges of temperature, in several of the Indian localities, and for some valuable hints on tropical disease. From my fellow-labourer Mr. Tufnell, who delivers a course of lectures on Military Surgery at the city of Dublin Hospital, I have had many interesting and valuable communications on the subject of my course; and it gives me great pleasure to think that the plan and execution of these Outlines meet with his approbation. To Dr. Irving, formerly a zealous and intelligent pupil of the class, from whom I lately received an interesting communication on the health of the troops in Bengal, I am indebted for the Bibliographical Record annexed to the volume. This list I have confined almost exclusively to the publications of Medical Officers in the service of the British Government, as giving a comprehensive view of their labours, and as more especially connected with those peculiar duties which the extent and variety of our foreign possessions necessarily impose upon them.

A copious list of foreign writers, particularly

those of the French and German Schools, was published in my Introductory Lectures many years ago; but this list I have hesitated to reprint, from an opinion that it occupied a space disproportionate to its utility, considering that few of these works are generally accessible to the students of Military Surgery, and few bear upon what are the more peculiar duties of Surgeons in the Service of Her Majesty, or of the Honourable East India Company.

In the present edition, the parts of this work which have undergone most careful revision are those bearing upon the diet, clothing, and lodgment of the troops, and on the equipments for the transport of sick and wounded. Upon this, and upon some other points, I have to express my obligations for a very valuable communication from Dr. Dumbreck, Deputy Inspector of Hospitals, giving me the result of his observations in the Crimea. I am also indebted to some of my naval friends, Dr. Deas, the head of the Medical Department of the Black Sea Fleet, to Dr. M'William, and to Dr. Burns, all old pupils of the class, for communications used in revising this edition. A few woodcuts from the Waterloo Sketches in my possession, have now been introduced for the first time, and I think they will show how well these sketches are calculated to illustrate some points in military surgery.

It has been well said, that an apology of haste or

want of time is disrespectful to the public, and indirectly a self-compliment to the author, inasmuch as it implies that, with more time, he could have made a better book. I desire to avail myself of no such apology, but I may be allowed to say, that if I had been aware that my work was so nearly out of print, its revision would have been a very agreeable occupation to me during a tedious winter in the country; and had my late lamented friend and colleague, Dr. Mackenzie, whose surgical talent was so generally acknowledged at the battle of the Alma, been spared to return, and to give me his assistance in the revisal of this volume, which I at one time ventured to hope for, I should have been enabled to make the work more worthy of the patronage it has met with.

University of Edinburgh,
10*th July* 1855.

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INTRODUCTION.

AMONGST the numerous subdivisions which now exist in the extensive range of medical science, the department of Military Surgery is neither in its origin the most novel, nor in its practice the least important; but it is only within a recent period that any provision was made for a course of public instruction in this branch of medicine. Although the spirited and successful enterprise of Mr. Tufnell has, within these few years, led to the establishment of a Lectureship on Military Surgery in the Irish metropolis, it is matter of regret that the professorship which I have the honour to hold is still the only one established by the Government in the medical schools of this kingdom. While this circumstance leaves me unfettered by habitual trammels or established usages in the conduct of my course, it lays me under a load of responsibility in presenting to my pupils and to the public an outline of the lectures which I have now delivered for upwards of thirty years in this university. A step, however, has recently been taken in the right direction, in so far that a sum of money was last year voted by Parliament for the endowment of Chairs of Military Surgery in the other two capital cities of the empire; and from a reply lately made in the House of Commons by the Under-Secretary of War, to the Honourable Member for the City of Dublin, it would appear that arrangements are in progress for carrying out this measure.

In entering upon the subject, it seems necessary to advert to some of those peculiarities which characterise Military Sur-

gery as a separate branch of study, to offer a few historical notices of the progress of the art itself, and of the lives of those who have been its most distinguished practitioners. Every one is aware of the great and leading division of the healing art into physic and surgery—a division which has existed from a very ancient date, and which it seems to me too much the inclination of the present day to abolish. A superiority in either of these provinces must, in a great measure, result from a knowledge of the same principles. Yet, at the same time, each of them will probably be carried farther when separately patronised by different institutions, and practised by different individuals. This, indeed, seems to accord with the decisions of experience; for of those who have arrived at singular eminence in either of these arts, few have chosen to invade the province of the other. "Cheselden did not prescribe in a fever, nor did Radcliffe undertake an amputation." But, however expedient such distinctions may be in civil life, if there is any one position in which it is impossible to adopt, or to follow out, a minute subdivision of professional labour, it is in the position of an army surgeon. It will readily be seen how inexpedient it would be to have our armies furnished with a host of followers in the shape of physicians, surgeons, accoucheurs, dentists, oculists, and aurists, each confining himself rigidly to his own province; their numbers calculated, in times of difficulty, to increase all the privations of an army, and leading in the day of battle to inextricable confusion.

It is not, however, in a combination of the two great branches of the profession that the essence of Military Surgery consists, so much as in the peculiarity of the circumstances in which they fall to be exercised; and it is not more in the surgical than in the medical division of the subject that this peculiarity exists. Military Surgery may be considered as a judicious application of all the subdivisions of the healing art to those varied circumstances in which soldiers are placed both in health and in sickness. "Ce n'est pas toutefois une science distincte, ni même une branche particulière de l'art de guérir, mais une application raisonnée de toutes les parties de cet art aux circonstances variées dans lesquelles se trouvent les hommes de guerre, tant en santé qu'en maladie."

This simple explanation will go far to obviate some of the objections which are occasionally made to Military Surgery as a separate branch of study. I have sometimes been tempted to think, from the tenor of their observations, that surgeons in civil life were fearful of being thought incompetent to the treatment of wounds, the amputation of limbs, and the management of other complaints which fall to be treated, if not more judiciously, at least more frequently, by the military surgeon. It is not enough for those who have passed an honourable and a useful life in the practice of domestic surgery, to exclaim, "Is the arm of the hero of the age, or the arms of his heroic followers, of a different anatomical mould from the limbs of him who guides the plough?" No military surgeon will say, in reply, that he ever dreamt of such a distinction; but he will say with truth, that the arm of his country's champion is subject to accidents of a kind little known to the ploughman or the labourer; and he will say that these accidents fall to be treated in circumstances totally unknown to the tranquillity of rural life.

But it is perhaps rather to the name than to the art, rather to the shadow than to the substance, that this objection has been applied. The term Military Surgery has been considered inappropriate to this department of medicine, as having too limited a signification, where a large proportion of the practice, in peaceable times, falls distinctly within the usual province of the physician; but I can see no great impropriety in applying to this subject as a whole, a term analogous to that which has at all times and in all countries been applied to its practitioners. It is indeed by no means unnatural that the art and its professors should have taken their designation from that branch of it which, upon all great and momentous occasions, constitutes its most distinctive feature. But, farther, I maintain, that the education of every man destined for the public service should be primarily and essentially surgical; no good, nor well-educated surgeon can be destitute of that knowledge of physic which will enable him, upon all occasions, to acquit himself with judgment and discretion, while, on the other hand, a man educated exclusively to physic, without the knowledge and also the practice of surgery, will upon many occasions, be found a most inefficient follower of

the camp. Of this several instances have fallen under my own observation, some of them abundantly ridiculous, were not the sense of ridicule lost in the inconvenience.

In this view of the matter I am fully borne out by the existing regulations of the British service at the present moment. By an edict of his late Majesty, the appointments of physicians to the forces were annulled, while the surgeons and assistant-surgeons retain their place; and it is not a little curious to observe, that after repeated changes in the designation, rank, titles, and implied acquirements of the medical officers of the army, we should now appear to be acting in conformity to the sentiments which prevailed upon this subject more than two hundred years ago.

In the preface to a Treatise on Gangrene and Sphacelus, written in the time of Charles the First, it is said, that "whereas, there hath been a question among some of the ancients by what name they may most properly call the artist; the more *learned* sort are justly styled by the title of physicians, and the more *experienced* sort are called chirurgeons, by means whereof sometimes there hath grown difference and offence, which I do advise each discreet surgeon to avoid, and that they give the physician his due honour and precedence, comparisons being odious and unmannerly amongst good men. Each man will conceive that medicine is a principal part of healing and curing of sores, diseases, and sicknesses; for who is he that can cure a wound, a tumour, an ulcer, yea but an ague, with his hand only, without fitting medicines? Surely no man. Then it must necessarily follow that surgery, diet, and medicine (I mean both outward and inward), are inseparable companions, and therefore all to be used in the art of curing man's body, and that in the person of one man; and why not then in the surgeon who practiseth on military occasions, as in ships and camps more especially, where neither his Majesty nor the merchant allows the physician or apothecary any place, and where the whole scope of healing the bodies of the bravest and most valiant warriours and hardie seamen are upon all occasions wholly referred to the skill of the surgeon?"

Without entering farther into those subdivisions of the healing art which have been established by convenience, cus-

tom, or caprice, I may observe that all arts, trades, and professions, expose those who practise them to different diseases—the number, nature, and severity of which vary according to the influences, more or less hurtful, to which individuals are subjected, and according to the kind of life which, by custom or necessity, they are compelled to lead. While many of the exercises and habits of soldiers are undoubtedly of an invigorating and salutary description, there is no class of men exposed to more numerous or more fertile sources of disease, in the frequent, sudden, and unexpected changes of climate to which they are subjected—in the urgent and unseasonable calls of duty which they must not disobey—in the privation of food, of shelter, and of every comfort to which they must occasionally submit; and in the thoughtless excesses of every kind in which they are too prone to indulge.

If to the study of all these causes, and their effects upon the human frame, we add the consideration of those complicated wounds which it is their peculiar lot to receive, we shall find abundant occupation for the exercise of all the talent and industry which the most active and assiduous professional man can bring to bear upon the subject of military medicine and surgery. "All those who have practised medicine in armies have observed, that the practice of it there presents difficulties which are very remarkable, whether on account of the nature and severity of the affections which attack soldiers, on account of the complicated forms in which those affections are met with in camps and in hospitals, or on account of numerous obstacles and interruptions to the usual and approved modes of treatment in civil life. Hence it is that, independent of the theoretical and practical knowledge necessary for every physician, he who is destined for the service of the army ought to have accurate and precise information with regard to the condition of the soldier, his manner of life, his habits, his duties, his exercises, the numerous causes of disease which beset him, and the extraordinary circumstances in which he is placed, particularly in the time of war."

These circumstances may be supposed to have claimed, more or less, the attention of reflecting men ever since war came to be studied as a science, or practised by civilised nations. It has indeed been observed by an elegant writer,

that "military surgery, rude and imperfect though it might have been, if not the very first, was at least amongst the earliest of the arts which the follies and the infirmities of mankind forced them to cultivate;" but it is obvious, that this remark applies rather to those imperfect traces of the art, such as it was practised by the heroes of antiquity, and noticed in the writings of historians, than to a branch of science which now affords a theme of study, and a field of occupation for a numerous class of practitioners. Military Surgery, as it now exists, is so much the creation of the late continental war, its principles have been so fully developed, and its future practice must be so much influenced by the experience acquired in the recent campaigns, that to this experience I must chiefly refer in laying down the rules of treatment applicable to those formidable diseases which assail our fleets and our armies, and to those severe and complicated injuries which it is the lot of the soldier and the seaman to sustain.

In proceeding to give a brief sketch of the history of Military Surgery, I conceive it quite unnecessary to dwell at any length upon the traces which we find of this art previous to the invention of gunpowder. This produced such essential changes in the features of war, and continues to exercise such a paramount influence in all our military operations, that to enter into details previous to its invention and employment in battle, were, in my opinion, not only superfluous, but altogether idle.

Of the consternation which the first use of gunpowder occasioned among the troops, we may form some idea from the following relation, extracted from Monro's account of his expedition with the worthy Scots regiment, called M'Kay's regiment, levied in August 1626. Speaking of the invention of artillery, he observes, "it is thought the invention of cannon was first found at Nurenberg, for the ruin of man; being at first, for a long time, used for battering down of walls and cities, and for counter-batteries, till at last they were used in the field to break the squadrons and battailes of horse and foot; some carrying pieces called spingards, of four foote and a halfe long, that shot many bullets at once no greater than walnuts; and how soon the trumpet did sounde, the enemy were thundered on, first with these as with shoures of hailstone,

so that the enemies were cruelly affrighted with them, men of valour being suddenly taken away, who before were wont to fight valiantly and long with the sword and launce, more for the honour of victory than for any desire of shedding of bloud; but now men are martyrised and cut down at more than half a mile of distance, by those furious and thundering engines of great cannon, that sometimes shoote fiery bullets able to burne whole cities, castles, houses, or bridges, where they chance to fall; and if they happen to light within walles, or amongst a brigadd of foot or horse, as they did at Leipsigh on the grave Von Torne his brigadd, they spoil a number at once, as, doubtless, the devilish invention did within Walestine."

Of the effects of cannon and grapeshot so pathetically described by Monro, none were more appalling, or led to more individual distress, than the new species of wounds presented to the view of the army surgeons. The alleged poisonous nature of the ingredients composing the powder, or of the balls projected by it, became the subject of their theoretical disquisitions, while their practice was mostly confined to prayers, charms, and incantations. It was at the same time expected that "Surgeons should be men of sobrietie, of good conscience, and skilfull in that science, able to heal all soares and woundes, specially to take oute a pellet oute of the same."

It was not, however, until the wars in which France was involved between the years 1732 and 1743, that the subject of Military Surgery began to assume anything of its present systematic form. Hitherto the states of Europe had been content to enjoy the benefits of the labours of military surgeons, without having taken any direct part in the honour or advancement of this art. In France, indeed, various ordonnances were issued between 1718 and 1747, containing some dispositions favourable to the instruction of young surgeons destined for the services of the hospitals and troops; but these, it appears, had been but very imperfectly executed during the war. The peace of 1763 appeared favourable to Richard, who was nominated inspector of hospitals, to realise a project which he had formed while first physician to the army in Germany, and he submitted to the Duc de Choiseul,

then minister of war, the propriety of requiring the army surgeons to give a regular account of their practice, and to correspond with the inspector-general on the subject. From this correspondence, an interesting volume, under the title of "Recueil d'Observations de Médecine des Hôpitaux Militaires," was published in 1766, and another in 1772. The many valuable memoirs contained in these two volumes, appear to have in some measure rivetted the attention of the French government to this subject, and to have greatly contributed to the improvement of military medicine in France.

The favourable impulse thus given, led to the translation into French of the excellent work of our countryman, Dr. Donald Monro, and to the publication of the "Code de Médecine Militaire" in 1772, and of another treatise, "d'Hygiene Militaire," in 1775, by Colombier, one of their most distinguished physicians. Long accustomed to live with the soldier, acquainted with his habits, his tastes, his prejudices, his fatigues, and his dangers, he was well qualified to lay down rules for the preservation of his health, and, in 1778, Colombier gave to the public a general and valuable treatise on the health of soldiers, in seven volumes octavo.

The publication of these various works, in which questions the most important to the service of the hospitals were discussed, created a considerable sensation amongst the ministers of Louis the Sixteenth, and led to various ordonnances, by which the publication of the correspondence of the army surgeons, which had fallen into disuse, was again decreed; and schools of instruction for those devoted to the public service were established at Lisle, at Mentz, and at Strasbourg. By a subsequent decree of the 1st of July 1778, the plan of committing the care of sick soldiers to their respective regimental surgeons, and the institution of regimental infirmaries, was established, against the remonstrances of many of the older surgeons. Indeed, it does not appear that this plan of conducting the treatment of the sick soldier, which is so well understood, and so highly appreciated in the British service, has ever acquired the same popularity and efficiency in France. The publication, however, of the records of the military hospitals in that country has gone on, particularly since the peace of 1815, with a most commendable spirit, under the auspices

of the secretary of state for the war department; and while we have excelled the French in the administration of our regimental hospitals, we have also, of late, been successfully employed in the publication of official documents bearing on the medical statistics of the army.

Amongst those who have successfully cultivated and extended the boundaries of Military Surgery in France, I would claim particular attention to one of their earlier writers, Ambrose Paré, who was successively surgeon to four kings of France, and who followed the French armies, in all their campaigns from 1536 down to the battle of Moncontour in 1569. In his writings, which were collected and published by Guillemau, at Paris, in 1582, we have a picture of the wretched state in which Paré found military surgery at the time he entered the service; and to him we are indebted for many substantial improvements in its practice. Endowed with a large share of good sense, this distinguished surgeon was at the same time obviously tinctured with the credulity of his age. He did not, as inadvertently stated in the first edition of this work, banish from practice the celebrated *oleum catellorum*, but, on the contrary, paid his court for two years and a half to an Italian surgeon at Turin, in order to obtain from him this famous secret for the cure of gunshot wounds. But while Paré took so much pains to introduce this strange application, he has, at the same time, the credit of exploding from surgery the cruel and noxious practice, prevalent in his day, of pouring *boiling oil* into gunshot wounds. To Paré, also, we are indebted for the introduction or revival of the needle and ligature, an improvement in the art of surgery for which his name will ever be respected.

Paré's humanity would appear, from the following anecdote, to have been equal to his skill:—"A party had gone out to attack a church (where the peasants of the country had fortified themselves), hoping to get some booty of provisions, but they came back very soundly beaten; and one especially, a captain-lieutenant of the company of the Duke de Rohan, returned with seven gashes on his head, the least of which penetrated through both tables of the skull, besides four sabre wounds in the arm, and one across the shoulder, which divided one-half of the shoulder blade. When he was

brought to quarters, his master, the Duke, judged him to be so desperately wounded, that he absolutely proposed (as they were to march by daylight) to dig a ditch for him, and throw him into it, saying, that it was as well that the peasants should finish him. But being moved with pity, I told him, says Paré, that the captain might yet be cured; many gentlemen of the company joined with me in begging that he might be allowed to go along with the baggage, since I was willing to dress and cure him. This was accordingly granted; I dressed him, put him into a small well-covered bed in a cart drawn by one horse. I was at once physician, surgeon, apothecary, and cook to him, and, thank God, I did cure him in the end, to the admiration of all the troops; and out of the first booty, the men-at-arms gave me a crown a-piece, and the archers half-a-crown each."

It was actions like this which brought Paré into so much repute amongst the French soldiery, that we find their princes and generals willingly took the field when they could prevail upon Paré to go out along with them; and at the time when all the noblesse of the kingdom were shut up in Mentz, which was besieged by Charles the Fifth in person, at the head of a hundred thousand men, they sent an embassy to the king their master, beseeching him to send Paré to them. An Italian captain, for a great reward, introduced him into the city; they instantly sent at midnight, to awaken the prince who commanded the garrison with the good news of his arrival. The governor begged of him that he would go next day and show himself on the breach. He was received by the soldiers with shouts of triumph. We shall not die even although wounded—Paré is amongst us! Mentz was at this time the bulwark of France, and it has always been ascribed to the presence of this single man, that they kept the city till the gallant army which lay around it perished beneath its walls.

To those instances of enthusiastic attachment on the part of the French soldiery towards a distinguished surgeon, I cannot resist the temptation of adding another, occurring in our own day, and occurring to one with whose friendship I was honoured, and whose memory I revere. Of all the dreadful scenes that occurred during Buonaparte's retreat from Russia, the passage of the Beresina was the most ter-

rific. The bridges broken down, and the enemy pressing in all directions, caused the most dreadful havoc and confusion. "Nothing was to be heard but the cries of thousands trodden under foot by their stronger neighbours—nothing to be seen but destruction and despair!" On that fatal day Baron Larrey nearly fell a sacrifice to his anxiety to preserve some cases of surgical instruments. The professional respect in which he was held saved his life. "No sooner was he recognised than the French soldiers, regardless of their own safety, passed him along from one to another till he crossed the only crazy bridge remaining." On this occasion the Baron was saved by the recognition of his friends. On another he nearly fell a sacrifice to the mistake of his enemies. When making his retreat from the field of Waterloo, he was surrounded and taken prisoner by a party of Prussian cavalry, who robbed him of his watch and his purse. Thinking that they had captured the Emperor of France, their joy was unbounded, but when undeceived, their indignation rose equally high. Poor Larrey was on the eve of being shot. He was ordered to be blindfolded, and was recognised at this critical moment by a Prussian surgeon, who had followed his clinique at Berlin, and who was in the act of placing a sticking plaster "emplâtre agglutanif" over his eyes. He was carried before Blucher, the Commander-in-Chief of the Prussian army, to whose son he had given his professional assistance on a former occasion. He was caressed by the Marshal, instantly liberated, and kindly treated. A volume might easily be filled with characteristic anecdotes of this remarkable man; of the attachment of the soldiery; and of the Emperor Napoleon—the Cæsar of modern times. To Larrey, and to his colleagues—to his brave surgeons, as he called them—Buonaparte often conveyed his thanks in words which vibrated to their hearts, in that encouraging language which he knew so well how to use. "It is not for me," says the son of my distinguished friend, "to recount what he did, and what he would have done in better times for him whom he loved most amongst all his surgeons—for him whom he had known on every field of battle, and to whom he bequeathed a legacy, and paid a flattering compliment on his death-bed."

Although I have been tempted to give this brief notice

of one who may be justly termed the father of Military Surgery in France, and of another the most celebrated amongst its modern practitioners, yet I do not propose to trace the lives of those numerous writers belonging to the same nation who have done honour to themselves and to this art. I must rather confine myself to the history of Military Surgery in England, chiefly as portrayed in the lives of those distinguished individuals who, after spending a portion of their time in an irksome attendance upon the armies, have left, in their writings, proofs of a professional enthusiasm, and a devotion to the service of their kings, princes, and generals, which carried them through inconceivable toils and privations, while rewarded only by a pittance which, in the present day, would be spurned at by the lowest menial.

Of the amount of this pittance, it so happens that a very minute and particular account has been preserved in Rymer's Fœdera, from which we learn that, when Henry the Fifth of England carried on war with France, in 1415, he took into his service Nicholas Colnet, as field-surgeon for a year. He was bound to carry with him three archers on horseback, and to accompany the king wherever he went. In return he was to receive yearly forty merks, to be paid at the rate of ten merks per quarter, "with the usual regards." He was allowed also twelve pennies per day as subsistence money, and each of his archers had twenty merks a year, and six pennies daily as subsistence. The chief army-surgeon, Morstede, who served in the battle of Agincourt, was engaged with fifteen men, three of whom were to be archers, and the remaining twelve surgeons. Both Colnet and Morstede could receive prisoners and plunder; but when the latter amounted to twenty pounds in value, a third part of it was to be given to the king. Those head men got each a quarter's pay in advance; and that they might always have security for the next quarter, the king engaged to put into their hands, by way of pledges, as many jewels or other articles as might be equal to one quarter's pay and subsistence. What was the actual value, and what the extent of the professional services rendered to the king by Colnet and Morstede — whose remuneration was thus minutely specified and carefully secured — we have no means of judging, neither of them

having left any professional writings which have been transmitted to our times.

The next Military Surgeon of England whose services and whose writings entitle him to notice, is Thomas Gale, who was born in 1507, and educated under Richard Ferris, sergeant-surgeon to Queen Elizabeth. Gale served in the army of King Henry the Eighth at Montrieul, in 1544, afterwards in that of King Philip at St. Quintin, in 1557, and finally settled in London, where he became eminent in the practice of his profession. His works were published in 1653, and, amongst other surgical writings, contain a "Treatise on Gunshot Wounds," designed chiefly to confute the error of Jerome of Brunswick, John de Vigo, Alphonsus Ferrius, and others, in supposing these wounds to be of a venomous nature. He takes pains also to prove that a bullet does not acquire such a heat in its motion, as to render its wound similar to a cautery, which was then the common opinion; thence he recommends a milder method of dressing these wounds, directing his endeavours to the procuring a laudable digestion, and in all respects considering them as common contusions. A subsequent volume of this surgeon's works is dated in 1566. The first two pieces it contains are "A Brief Declaration of the Worthy Art of Medicine," and, "the Office of a Chirurgeon." The chief object of these tracts is to give a general history of the healing art, and to inculcate the necessity of a scientific method of study in attaining it. Numerous complaints of the intrusion of illiterate pretenders and empirics into the practice of medicine and surgery are interspersed through these pieces, some of which are worth notice, as they contain curious information of the state of the profession at the time.

Of the deplorable condition of military practice in the time of Gale, we may judge from the following relation:—"I remember," says he, "when I was at the wars at Muttrel, in the time of that most famous prince King Henry the Eighth, there was a great rabblement there that took upon them to be surgeons. Some were sow-gelders, and horse-gelders, with tinkers and cobblers. This noble sect did such great cures that they got themselves a perpetual name, for like as Thessalus's sect were called Thessalians, so was this rabblement, for

their notorious cures, called dog-leeches; for in two dressings they did commonly make their cures whole and sound for ever, so that they neither felt heat nor cold, nor no manner of pain after. But when the Duke of Norfolk, who was then the general, understood how the people did die, and that of small wounds, he sent for me and certain other surgeons, commanding us to make search how these men came to their death, whether it were by the grievousness of their wounds, or by the lack of knowledge of the surgeons; and we, according to our commandment, made search through all the camp, and found many of the same good fellows, which took upon them the name of surgeons—not only the names, but the wages also. We asking of them whether they were surgeons or no, they said they were. We demanded with whom they were brought up; and they, with shameless face, would answer, either with one cunning man or another who was dead. Then we demanded of them what chirurgery stuff they had to cure men withal; and they would show us a pot or a box, which they had in a budget, wherein was such trumpery as they did use to grease horses' heels, and laid upon scabbed horses' backs; and others that were cobblers and tinkers, they used shoemakers' wax, with the rust of old pans, and made therewithal a noble salve, as they did term it. But in the end this worthy rabblement was committed to the Marshalsea, and threatened by the Duke's Grace to be hanged for their worthy deeds, except they would declare the truth what they were, and of what occupation; and in the end they did confess as I have declared to you before."

The next writer of note upon Military Surgery is William Clowes, who appears to have commenced the practice of his profession as a navy surgeon, as he mentions serving on board one of the Queen's ships called the Aid, in 1570. He afterwards settled in London, was appointed surgeon to St. Bartholomew's and Christ's Hospitals, and was subsequently sent for, by letters from the Earl of Leicester, general of the English forces in the Low Countries, to come and take upon him the care of the wounded men; and thither he went in 1586, by command of the Queen, together with William Godorus, her serjeant-surgeon. His earliest publication, entitled, "A Brief and Necessary Treatise touch-

ing the Cure of the Disease now called Lues Venerea," was first printed in 1585; here he laments the great frequency of the disease, and in proof of this states, that in the course of five years he had cured about a thousand venereal patients in St. Bartholomew's Hospital. The next and most important work of Clowes, is "A Proved Practice for all young Chirurgeons, concerning burnings with gunpowder, and wounds made with gunshot, sword, halberd, pike, launce, or such other." In the treatment of gunshot wounds he adopts what has sometimes passed for a more recent improvement, the use of mild emollient dressings; and in the relation of several dangerous and complicated cases of this sort, shows himself a skilful practitioner. For the suppression of hæmorrhage after amputation, he employed buttons of an absorbent and mildly astringent powder, applied to the vessels, and sustained by bolsters of lint and tow, with strong compression. This, he says, never failed him, and though he was acquainted with the method of drawing out and tying the arteries used by some French surgeons, he never practised it. He speaks everywhere with great respect of his cotemporaries of the profession, both native and foreign, but is severe upon empirical pretenders, many of whom, he laments, were entrusted to practise on board of her Majesty's ships, to the great detriment of the service.

In "A Discourse on the whole Art of Chirurgery," written by Peter Lowe, in the form of a dialogue between himself and his son, and dedicated to James Hamilton, Earl of Abercorn, we find that Scotland has the honour of being the author's birthplace. He acquaints his readers that he had practised two-and-twenty years in France and in Flanders, had been two years surgeon-major to the Spanish regiment at Paris; and had followed his master, Henry the Fourth of France, in his wars, six years. In the title-page of his book he calls himself Doctor in the Faculty at Paris, and ordinary surgeon to the king of France and Navarre. His work is dated from his house in Glasgow, Dec. 20, 1612. How long he had been settled there does not appear, but he mentions that, fourteen years before, on his complaining of the ignorant persons who intruded into the practice of surgery, the king of Scotland granted him a privilege under his

privy seal, of examining all practitioners in surgery, in the western parts of the kingdom; and in virtue of this grant, the Faculty of Physicians and Surgeons in Glasgow, claiming to be the lineal offspring of Peter Lowe, was recently engaged in a lawsuit, for the purpose of compelling those gentlemen who have obtained the degree of Master of Surgery from that University, to submit to a farther examination before the Faculty, previous to their being licensed to practise in that district. Lowe's work appears to have been sufficiently esteemed in its day, a fourth edition having been printed in London in 1654; and of the author's private character we have an amiable picture from a rude epitaph on his tombstone in the Cathedral Church of Glasgow, quoted by the antiquary Pennant.

About the year 1549 was born John Woodall, a distinguished military surgeon, and who, in that capacity, went over to France in 1589, with the troops sent by Queen Elizabeth to the assistance of Henry the Fourth under Lord Willoughby. On his return to England, after a lapse of several years spent in travelling on the Continent, he settled in London, became a member of the Surgeon's Company about the year 1612, was elected Surgeon to St. Bartholomew's Hospital, and also surgeon-general to the East India Company. It is to be inferred from several circumstances, that he was employed some considerable time as surgeon to a ship, and in that capacity made one or more voyages to the East Indies. In 1626, when the naval forces of the kingdom were augmented, and warlike preparations were carried on with vigour, the charge of fitting out the chirurgical part of his Majesty's service was committed to the Corporation of Surgeons, and by them to Woodall. The king, Charles the First, on this occasion, augmented the pay of the navy surgeons, and granted a sum of money proportionate to the rates of the ships, towards furnishing the medicine chests. Among several other publications of Woodall, those more immediately connected with military and naval practice, are his "Surgeon's Mate," the earliest of his productions, which contains an enumeration of all the instruments, utensils, and medicines of a surgeon's chest, with a brief description of their uses and qualities. His next work, entitled "Viaticum, or Pathway

to the Surgeon's Chest," was written in 1626, and published two years after. It is written with the same general design of instructing young practitioners, chiefly in reference to the treatment of gunshot wounds, although under this head there is nothing materially different from what was given in his Surgeon's Mate. The last of his works is a Treatise on Gangrene and Sphacelus. Several useful remarks on amputation occur in this tract, and it seems to contain the first hint of amputating as low as the ankle, in diseases of the foot. For having observed, while in the East Indies, that persons who had undergone the punishment of having their feet cut off, were able to walk very well, after the stumps were healed, by putting them into cases of bamboo, he expresses a wish that the practice might be imitated by surgeons, though he acknowledges that "he himself should not venture upon such an innovation."

The next author whom I shall mention, demands especial regard, whether we look upon him in his civil or his military capacity. I mean Richard Wiseman, serjeant-surgeon to King Charles the Second, who was bred amidst the horrors of our civil wars—serving a long and weary apprenticeship to that profession, in which at last he attained to an eminence scarcely surpassed by any man since his time. Of his eight "Chirurgical Treatises," my edition of which is dated in 1676, one is expressly devoted to the consideration of gunshot wounds; and in this, after adverting to the great contentions amongst the learned, about fire and venom in such wounds, he observes, "in these our later times, although they do not call them venomous, yet it is a difficult thing to dissuade many of our chirurgeons from dressing these wounds with the tincture of myrrh, and honey of roses, and thrusting in of great tents." Amongst many very remarkable cases, and excellent precepts, which Wiseman's work contains, he observes, "in heat of fight, whether it be at sea or land, the chirurgeon ought to consider, at the first dressing, what possibility there is of preserving the wounded member; and, accordingly, if there be no hopes of saving it, to make his amputation at that instant, while the patient is free of fever;" thus giving his testimony in favour of the practice of immediate amputation—a point to which we shall, in a subsequent

part of the course, have particular occasion to advert: a point which was the subject of much discussion during the late campaigns; and which discussion, after the lapse of a hundred and seventy years, terminated in confirming the maxim so distinctly laid down by Wiseman.

Two years after the appearance of Wiseman's chirurgical treatises, "A complete Discourse on Wounds, both general and particular: as also, a Treatise on Gunshot Wounds in general," was published at London, by John Brown, sworn chirurgeon in ordinary to King Charles the Second. This is a work of considerable learning, and is illustrated by a reference to the author's experience in the navy, during the Dutch war of 1665, in which he was severely wounded.

From this period until 1744, we have no express treatise of any note on the subject of wounds, which I have hitherto been considering as more particularly the province of Military Surgery. In this year, a small treatise on "The Method of treating Gunshot Wounds," was published by John Ranby, principal serjeant-surgeon to King George the Second. A second edition of this work appeared in 1760, containing the result of the author's observations while he had the honour of attending his Majesty to the wars in Germany. "This work," says he, "was penned in a camp, and was intended to recommend plentiful bleeding very early, in the treatment of gunshot wounds: to advise likewise the application of light easy dressings to them, and particularly to introduce the signal use of the bark."

The next English writer who falls to be noticed, is one whose physiological and surgical talents have elicited so many compliments, that the language of panegyric is nearly exhausted in his praise. I shall readily be anticipated in mentioning the name of John Hunter, whose imperishable work on "The Blood, Inflammation, and Gunshot Wounds," was published in 1794, and contains observations drawn from the author's experience while serving as staff-surgeon at Belleisle, and in Portugal; subsequently to which he was appointed surgeon-general to the army, and inspector of regimental infirmaries. Mr. Hunter's work above referred to, and his treatise on the venereal disease, another subject peculiarly

interesting to the military surgeon, are universally known and generally esteemed.

From the date of Mr. Hunter's writings until 1804, no work appeared on the subject of wounds which claims any authority from the experience of its author. In this year was published "Chirurgical Institutes on Gunshot Wounds," by St. John Neale, a work which, although the writer alludes to his personal experience during the American war, has never attracted much attention, having been generally looked upon as a translation of Le Dran.

The conclusion of the war with France in 1815 was followed by the appearance of two excellent works on Military Surgery; those of Mr. Guthrie and Dr. Hennen. Mr. Guthrie's "Treatise on Gunshot Wounds" was first published in 1815; and in subsequent editions has been greatly enlarged and improved, embracing observations on "Inflammation, Erysipelas, and Mortification; on Injuries of Nerves, and on wounds of the extremities requiring amputation." The more important parts of this author's numerous works on Wounds, and on Military Surgery, have recently been concentrated in a volume entitled "Commentaries on the Surgery of the late War in Portugal, Spain, France, and the Netherlands." This is illustrated by the most extensive experience which perhaps any of his countrymen have ever enjoyed, and forms a work which every one agrees in considering a standard authority upon those points of which it treats. To Mr. Guthrie the profession, generally, is indebted for several important surgical works on ophthalmia, hernia, diseases of the bladder and urinary organs, equally interesting to the civil and military practitioner. The young surgeons of the army I consider particularly indebted to him for his Clinical Lectures—a work to which I have always pointed the attention of my pupils, a work in which he has powerfully advocated their interests, and given them a vivid picture of the realities of the service.

Dr. Hennen's work, a third edition of which has been published by his son, under the title of "Principles of Military Surgery," is illustrated by many of the interesting cases which occurred at the battle of Waterloo. Its nature and objects will be best understood from the elegant language of its author.

"At the termination of a series of wars, which for a large portion of a century have desolated the finest regions of the European world, and drenched their fields in blood, the medical philanthropist will naturally ask, what results have accrued from such ample sources of experience? What progress has been made in softening the miseries of pain and disease, and in extracting from such multitudes of victims antidotes to the waste of human life? The younger practitioner also who may enter the service of his country will inquire, where am I to collect the fruits of that experience with which so many campaigns have enriched my predecessors? and how, if the opportunities come within my reach, am I best to avail myself of them? "It is in some degree," says Dr. Hennen, "to answer these interrogatories that I have ventured to make the following observations. In arranging them I have carefully availed myself of the written and oral remarks of the best army surgeons, both domestic and foreign, to whose works and conversation I have had access, or who possessed more experience than myself. I have studiously avoided controversial discussions, when they could lead to no practical result; and theory, unsupported by experience, I have altogether rejected."

In 1816 was published the first edition of a work entitled "Practical Observations on Surgery," by Mr. Copeland Hutchison, an experienced naval surgeon, who shortly after published some farther "Observations on the proper period for amputating in Gunshot Wounds." This contains a series of reports on the surgical cases after Lord Exmouth's naval action at Algiers, and is enriched with many valuable observations which entitle Mr. Hutchison to the same distinguished consideration in the naval branch of the service which Guthrie and Hennen hold in the military department.

Within the last few years, we have also been favoured with another work from the naval department, by Sir Stephen Hammick, formerly surgeon of the naval hospital at Plymouth, which contains many valuable observations on amputation, fractures, and strictures of the urethra.

In Dr. Thomson's report of the state of the wounded in Belgium after the battle of Waterloo, which was published here in 1816, there is much information highly interesting to

the military surgeon; and his chapter on amputation contains an admirable history of that operation.

Mr. Samuel Cooper of London, and my late colleague, Mr. Allan of this city, although their observations have not been published in a separate form, but introduced into their systematic works on surgery, are also entitled to a distinguished place amongst those who have given to the profession the fruits of their personal experience in the treatment of wounds.

At the head of a numerous list of writers, who, although not military surgeons themselves, have yet given us many important observations on this branch of surgery, stands Mr. John Bell, whose discourses on wounds, published here in 1795, contain much ingenious doctrine, and many excellent practical precepts. To his brother Sir Charles Bell we are indebted also for many interesting and valuable observations on wounds; and here I must not omit to mention the ingenious little work of Mr. Chevalier on Gunshot Wounds, published in 1804, and which had been distinguished the preceding year by obtaining the Jacksonian Prize awarded by the Royal College of Surgeons of London.

In the above list I have confined myself almost exclusively to writers of the English school. To enter into anything like a circumstantial account of the writings of foreign authors, would carry me far beyond the bounds necessarily assigned to this preliminary detail. Of these I cannot undertake even a bare enumeration; but I may observe that, in the list of French writers on Military Surgery, numerous beyond that of any other country, the names of Belloste, Le Dran, Faudaque, Ravaton, and Le Cat, hold a conspicuous place, while the memoirs of the French Academy of Surgery teem with communications from various authors on subjects abundantly interesting to the military surgeon. In times more recent, the names of Lombard, Briot, and Bandens, are honourably distinguished. At the commencement of the revolutionary war, Baron Percy published an excellent little work, under the title of "Manuel de Chirurgien d'Armée;" and towards the close of that war, Baron Larrey communicated to the world, in his "Mémoires de Chirurgie Militaire," the results of his extensive experience in numerous campaigns.

Some of these authors evince a practical acquaintance with the subject, superior perhaps to what has been shown by writers of the same period in our own country; but whatever advantage they had to boast of at the beginning of the late arduous and protracted conflict, before its termination our surgeons were in noways behind those of the enemy in skill, dexterity, judgment, or in any other qualification becoming an accomplished army surgeon.

While we may please ourselves with the foregoing reflection, we must admit that in the formation of schools of Military Surgery, and in the attention given by the State to the instruction of medical men for the service of the army, the French, the Prussians, the Austrians, and other continental nations, have gone far before us. Of this abundant and useful proofs will be found in the Journal of Military Medicine, Surgery, and Pharmacy; and in a continuation of it, under the title of "Recueil des Mémoires de Médecine, de Chirurgie, et de Pharmacie Militaires," published at Paris, by order of the secretary of state for the war department—a work now extending to upwards of sixty volumes, and from which we learn that in the medical schools established in the military hospitals, "Hôpitaux d'Instruction," at Mentz, at Lisle, and at Strasbourg, the system of clinical tuition was first made known to the medical youth of France. In the limited establishments of this country we have little to compare with the Institution of Frederick William the Second at Berlin, and the Josephinum Academy at Vienna, established for the special purpose of supplying medical men to the Austrian army. "MUNIFICENTIA ET AUSPICIIS IMP. CÆS. JOSEPHI II. P. F. SCHOLA MEDICO-CHIRURGICA MILITUM MORBIS ET VULNERIBUS CURANDIS SANANDISQUE INSTITUTA ÆDE ET OMNI SUPPELECTILI SALUTARIS ARTIS INSTRUCTA."

To the completion of the "Statistical Reports of the Sickness, Mortality, and Invaliding among the Troops," I look forward as a most important step towards the better instruction of those young men who are destined for the medical service of the army and navy of Great Britain. At the conclusion of the last war, when the late Director-General of the medical department came into office, a series of annual reports and returns was called for, which has since been progressively

accumulating to the amount of two hundred folio volumes. By the joint labours of Colonel Tulloch and of Deputy-Inspector-General Marshall, a summary of the contents of these volumes has been prepared, and is now in the course of publication, being presented to both Houses of Parliament by command of her Majesty. When finished, this will give a complete view of the diseases in the British army for upwards of twenty years, in every quarter of the world where a soldier has been stationed, and, along with the "Statistical Reports on the Health of the Navy," will contain a body of authentic information on the diseases incident to soldiers and seamen, such as no other nation has the means to afford.

I have already mentioned many of the most conspicuous names in the province of what may be more strictly termed Military Surgery; but were I to stop my enumeration here, I should lead to a very imperfect and erroneous opinion of the nature of the service, of the duties which devolve on a military medical officer, and of the merits of many who have performed these duties with honour and success. The carnage, even in the great battle of Waterloo—an event sufficiently unique and distinguished to mark the age we live in—is in no long time equalled by the mortality amongst those brave men who are employed in defending our foreign possessions, and it would be unpardonable to omit mentioning numerous authors who have written well upon the diseases to which our troops are exposed in these distant climates. I have yet said nothing of the writers on the diseases which afflict the soldier in camp and in garrison; amongst these, the names of Pringle, Brocklesby, Monro, and Cleghorn, stand particularly conspicuous; amongst writers on the diseases more peculiarly incident to seamen, Lind, Blane, Trotter, and Burnett, hold the most distinguished place; and from a numerous catalogue of writers upon tropical diseases, I would particularly recommend the works of Hunter, Jackson, Bancroft, Chisholm, Curtis, Johnson, Annesley, Twining, Martin, and Geddes.

In adverting more particularly to our own position in this great school of medicine, and to the utility of a separate class for the instruction of military and naval surgeons, I may observe, that in a letter addressed to me many years ago, by the late Director-General of the medical department of the

army, he expresses his deep regret that similar establishments do not exist in the other universities of this country; and both he and the Director-General of the naval medical department have shewn their estimate of such a course by the patronage given to the pupils of this class. Mr. Guthrie, in the preface to his Clinical Lectures, has strongly urged this matter on the attention of Government. "It is thought proper," says he, "to employ a gentleman of high character in his profession to teach the veterinary surgeons how to cure the horses of the army, and surely something of the same kind should be done for the men." I have also been gratified by perceiving in the preface to Baron Larrey's "Clinique Chirurgicale," a work for which I am indebted to its distinguished author, that he also expresses his regret at the want of a similar establishment in the French service, and spoke of it to me as a "lacune" in the Parisian school; the import of such an expression from the most experienced military surgeon of this, or of any age—a man of forty years' experience, and of six-and-twenty campaigns—cannot fail to be fully understood.

But while I thus refer with pleasure to the sentiments of some of the living, I must not omit to do justice to the memory of the dead—to the memory of one who, although not a military surgeon himself, was perhaps better qualified than any man of his day to have done honour to this department of practice; to whom I hold this school of medicine in general, and this chair in particular, to be deeply indebted; and who advocated the cause of military and naval surgery with an energy that can never be surpassed. The late Mr. John Bell, after having been educated in the dissecting-room, and practised in a large civil hospital—after being fraught with every information which could grace a practitioner and a teacher—left this his native city, and repaired to the naval hospital at Yarmouth, to witness the treatment of the seamen wounded in the battle of Camperdown. Here we must suppose that he soon saw enough to convince him of the advantages likely to accrue from a course of instruction specially adapted to military and naval surgeons. In a memoir dated from Yarmouth in January 1798, and addressed to Earl Spencer, then first Lord

of the Admiralty, he dwells on the disadvantages under which the naval surgeons of that day laboured, and urges upon the Government the formation of a national school of military and naval medicine.

"Ever," says he, "since I have been capable of thought, I have struggled for objects far beyond my reach to obtain. In this anxious moment, when I have about me no selfish views, no mean nor worldly cravings, no desires which I should not be proud to avow, there dwells upon my mind this oppressive and prophetic feeling, that I am perhaps going to suffer the sorest of all disappointments. I am upon the eve either of achieving by my zeal a great public good, or of preventing by an imprudent and too sudden movement, a new order of things in that department which needs most of all to be improved.

"But, my Lord, I have a claim upon your Lordship which you will not refuse: I have studied naval surgery with particular care; I have bestowed upon it of money, of time, of labour, more than I am entitled to bestow; I have followed your victorious fleet, and attended your prisoners and your wounded, as if I had been attached to Government by old services and high rewards. These, my Lord, are my privileges. I am now retiring from this busy scene, and all my claim to your Lordship's notice is this desire to be useful.

"I am but ill prepared to speak upon the most interesting of all subjects. I am fearful of that enthusiasm which is so apt to mix itself with thoughts such as I am now to lay before your Lordship. I am anxious above all how my advice may be received by those accustomed to judge of high matters; yet I feel myself entitled to propose the establishment of *one great school of Military Surgery*. It were almost, I think, an object of national gratitude. Surely it were an institution humane, charitable, useful above all others." This spirited writer then goes on to deplore the very inadequate encouragement held out to the naval surgeons of that day, and the consequent difficulty of obtaining men of competent education for this branch of the public service. "Perhaps," says he, "in a whole fleet there are few surgeons' mates, not one, may be, who is able to perform the greater operations of

surgery. It has happened that, after the most earnest entreaties of the officers, of the surgeon, and of every one concerned, a ship of the line has gone into battle without one assistant on board; no, not one to screw a tourniquet, to tie an artery, to hold a shattered stump, to put a piece of lint on a bleeding wound."

Great improvements have been made in the situation of the naval surgeons, owing to the strenuous and unremitting exertions of the present head of the department, and more will be enforced by the all-powerful voice of the British Parliament. There no longer exist those deficiencies either in their number or in their professional education which Mr. Bell so feelingly laments; and which, in the mutiny of 1797, led the seamen to petition, amongst other things, for "better attendance when sick, and when wounded in action." Amongst those who laboured early, and struggled hard, to benefit this branch of the public service, I cannot omit to mention Dr. Trotter, the venerable author of the "Medicina Nautica," and the veteran Sir Gilbert Blane, who left a fund for the annual award of a gold medal for the encouragement of the naval surgeons.

But Mr. Bell, to whose memoir I return, was not satisfied with pointing out the evil which existed. He entered into various details for its removal, and laid down a plan for a course of Military Surgery, which shows that he entertained a perfect conception of what was wanted in a course of this kind.

"1. The professor," says Mr. Bell, "must teach with perfect care the essentials of anatomy; the great principles of surgery he must found upon dissections; and all the great operations, all the accidents which each part of the body is liable to, all kinds of wounds, must be fully explained.

"2. These general principles of the science must next be applied to the peculiar duties of the military surgeon. The professor must teach carefully the peculiar nature of gunshot wounds.

"3. He must deliver a short code of military medicine, explaining the fevers, fluxes, spasms, infectious diseases, and all the peculiar duties of the camp and the hospital; he must

also explain the scurvy, ulcers, and all the disorders most frequent in ships of war.

"4. He must teach medical geography; the climates, seasons; coasts of various countries; the manner of conducting soldiers on a foreign expedition; the general care of their health; the choice of encampments; the forming of hospitals on shore; how to convert churches, garrisons, public buildings, into occasional hospitals; how to attend an army in the field; how to lay the wounded in besieged towns; how to carry them off the field in a retreating army.

"5. Along with these must be taught military economies, diet, exercise, clothing, general medicine, and all methods of preventing disease. Without this knowledge no man is entitled to serve. How few are thus taught? How few are fit for service? How few are there who are not conscious of those blurs and blots in their general education, which no diligence of their own can ever do away?

"6. The last and not the least important duty of the teacher should be to point out for his pupils a future plan of study; to make for them a selection of books; to deliver critical and practical observations on those which are to be most used. The teacher must not only instruct his pupils for the present, he must select objects for their future study. He must teach them this truth, that their education is only begun, and that the best of their studies remain as yet untouched; he must show them how to think for themselves, and then he may hope to reap in his turn the fruit of their labours, and to live to see their observations and cases published under his own care."

Of the peculiarities of the study on which we are about to enter, I have already attempted to give some general idea. Every candid man who is conversant with the recent writings of military and naval surgeons, will admit that there are a sufficient number of accidents peculiar to military life, or at least of accidents so modified in their nature, progress, and treatment, by the circumstances peculiar to military and naval life, as to afford ample room for a course of this kind; and of the numerous inducements which are held out to the study of surgery in general, none are more striking than those arising

from its obvious importance to military men. "We must," says Dionis, "allow the necessity of chirurgery, which daily raises many persons from the brink of the grave. How many men has it cured in the army? How many great commanders would have died of their ghastly wounds without its assistance? Chirurgery triumphs in armies and in sieges. 'T is there that its empire is owned; 'tis there that its effects, and not words, express its eulogium."

SELECTION AND EXAMINATION OF RECRUITS FOR THE ARMY.

BEFORE proceeding to the treatment of those accidents and diseases peculiarly incident to soldiers and seamen, it will be useful to advert to some of those points in the physical constitution of individuals which best qualify them for the duties of a soldier, and to some of those circumstances in the accommodation and equipment of troops, upon the due regulation of which their efficiency and exemption from disease mainly depend.

The subject which naturally presents itself as the first object deserving our attention, is the materials of which an army is composed. "The selection," says Dr. Jackson, "of persons possessed of intellectual and physical capacity for the practice of war, and the systematic instruction of persons so selected in approved forms of discipline, may be regarded as an object of high national concern. It conduces to the preservation of national independence, and on this ground it demands the deepest attention of patriotic statesmen and the closest study of scientific soldiers."

In the celebrated work of Vegetius "*De Re Militari*," we have some curious and interesting observations upon this subject. He remarks, that "all nations which are near the sun are dried by too much heat, that they are indeed abundantly wise, but unsteady in action—having too little blood, they are fearful of wounds; that northern nations, on the other hand, abounding in blood (*largo sanguine redundantes*), are more determined in battle, but are rash and inconsiderate." He therefore prefers conscripts from the more temperate regions, the "inhabitants of which have a sufficiency of blood

to render them regardless of wounds and of death; while prudence is not awanting, which preserves moderation in camp, and does no little good in council and in action." In his 3d chapter, he inquires whether recruits from the country or from towns are the more useful, and hesitates not to give the preference to the rustic;—"bred in the open air, and in laborious occupation, capable of bearing the sun's heat, and negligent of shade, ignorant of baths and of delicacies, of a simple mind, and inured to toil, the warrior and the husbandman are the same, with only a change of weapons." From the country, therefore, the strength of an army is to be supplied; "for I know not," he exclaims, "how he should fear death most who knows least of the luxuries of life!"

In this work are many more observations to the same purpose; and however fanciful the reasonings of Vegetius may appear to be, it is surprising how nearly his practical conclusions correspond in many instances with the experience of more modern times. Dr. Jackson observes, that "the poor, the pastoral, and semi-barbarous nations seem at all times to have been the conquerors of the rich, the commercial, the manufacturing, the polished, and refined. The peasants of a country, particularly the shepherds and the hunters, are exposed in their daily occupations to vicissitudes of weather, and familiar with the situations and hardships which fall to the lot of soldiers in times of war. On the contrary, manufacturers and artisans, men little familiar with vicissitudes of weather, unaccustomed to exertion, to hardship, to fatigue, seldom temperate or healthy, helpless, and dependent on imaginary comforts, are ill calculated for the business of war." "Les privations, la pauvreté, la misere," said Napoleon, "sont l'ecole du bon soldat."

This view of the matter is strongly confirmed by a statement contained in a very interesting paper on the health of the Peninsular army, by Sir James M'Grigor, published in the sixth volume of the Medico-Chirurgical Transactions of London: "Of all the classes of society from which soldiers are recruited, I believe it will be found that, *cæteris paribus*, tradesmen and manufacturers, particularly those from large towns, are soonest swept away by the fatigues and diseases of an army; and that those who have followed agricultural pur-

suits are the most healthy. Three hundred and fifty-three recruits joined the 7th regiment in Portugal in the years 1810-11. Of these, two hundred and one were artificers and manufacturers, and one hundred and fifty-two had followed agricultural pursuits. In the course of a few months one hundred and twenty-two of the former died, and sixty-two of the latter; the proportion being six out of ten in the former case, and four out of ten in the latter."

These authorities go far to set the question at rest as to the superiority of the agricultural over the manufacturing part of the population for the purposes of warfare; and it is almost superfluous to add, that my own observation induces me to concur entirely in the opinions just quoted. For certain branches of the service—for the cavalry and horse-artillery particularly—recruits from the agricultural districts, men accustomed to the management of horses and of wheel carriages, are still more peculiarly eligible. And it may not be out of place to remark, with reference to the three great branches of the service, and to the description of men best adapted for each, that the infantry of the line are, during active operations, called upon for the most constant and unremitting exertions—are the most exposed to night duties, and in marching are loaded with their knapsacks, arms, and accoutrements, amounting to not less than sixty pounds weight. The duties of the cavalry, including the necessary attention to their horses, are also unremitting, but they are less exposed to night duties, and their marches are infinitely less fatiguing; the artillery are often subject to exertions of a laborious description requiring great physical powers, but they are much less exposed to harassing duties by night, and their services are more of a temporary or occasional character. This subject is well treated in a paper in the United Service Journal for September 1838, in which are also considered the advantages of national and district corps, and some interesting examples given of the good feeling which is fostered, and the *esprit de corps* which is maintained by this kind of selection.

The age at which soldiers are enlisted is a point of much importance, and does not appear to have always met with that attention which it merits. Upon the principle of inuring men from an early age to those pursuits in which they are subse-

quently to be employed, it is generally thought that we can scarcely enlist men too young. There is nothing, however, so mysterious in the duties of a soldier as to prevent a man, possessed of the necessary physical powers, from learning them at almost any period of life; while, on the other hand, by enlisting boys, before their growth is completed and their constitutions formed, it is quite impossible to foresee whether they will ever attain those physical powers necessary to capacitate them for the duties of a soldier; some of them will perhaps turn out better than we expect, but many of them will also, in all probability, turn out worse, and will ultimately prove a loss to the service, or what are termed in the army, "the King's hard bargains." It has been emphatically observed that young men fill the hospitals and not the ranks. "I demand," said Buonaparte, on a memorable occasion, "a levy of 300,000 men; but I must have grown men; boys serve only to encumber the hospitals and road-sides."

My sentiments upon this subject, as regards the selection of men for the Indian service, have long been before the public; and they are strongly confirmed by what has subsequently been written by the late Sir Whitelaw Ainslie, and by Sir James Annesley of the Madras army, as well as by Mr. Marshall and Dr. Burke of the Queen's service. Although my remarks upon the inefficiency of young recruits, in my essay on the "Diseases of the European Troops in India," refer chiefly to men employed upon that station, yet I believe they will apply to the service generally in all parts of the world. The opinion of Sir James M'Grigor upon this point may be gathered from the paper already quoted on the Health of the Peninsular Army, in which he observes, that "lads, unequal to the harassing duties of the service," as well as men whose frames have been worn out by disease, ought uniformly to be rejected; and Dr. Luscombe, in his work on the Health of Soldiers, is still more explicit upon this important subject. "I must give it," says he, "as my opinion, formed on observation and experience, that it is very prejudicial to the efficiency of an army to admit lads or very young men; for these are not only unequal to the fatigues of war, but their constitutions not being as yet firmly established, they are almost certain to suffer greatly from change of cli-

mate, and to become sickly even in the ordinary course of service."

Even in the continental armies, in which the troops have heretofore been employed almost exclusively in their native climate, similar objections have been made to young recruits. It was said, in derision of the Prince of Conde's army, that it would be a fine army when it came of age; and we find, both from Kirckhoff and from Coche, that they are decidedly opposed to premature enlistment. The latter in his work "De l'Operation Medicale du Recrutement," states it "as his deliberate opinion, that recruits at eighteen years of age are commonly unfit for the duties of the army, not only in time of war, but even during peace." On the other hand, when men are enlisted for an unlimited period, it is of importance that they should not be admitted at too advanced an age; and upon a full consideration of all the circumstances, I think we may state that the most eligible period of life for enlistment is from twenty to twenty-five years of age. These views are all too forcibly illustrated, and too fatally confirmed by recent events in the Crimea, and from the sentiments expressed by distinguished statesmen in both houses of Parliament, it is to be hoped that an end will now be put to the practice of sending youths abroad, not to live, but to die, at the public expense.

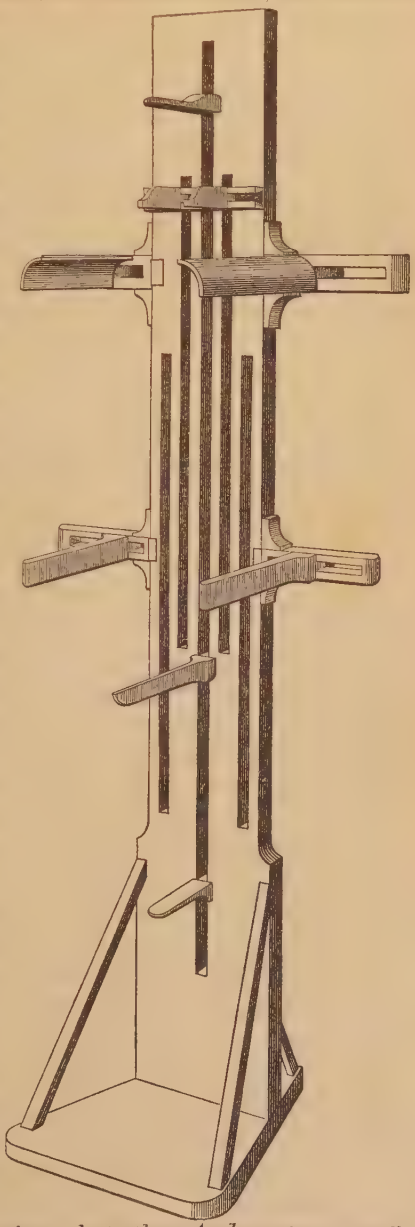
While adverting to the age for enlistment, it may not be considered altogether out of place to notice some interesting information brought forward by the late Sir Henry Halford as to the comparative duration of life in the two great branches of the public service. It appears from the returns of Greenwich and of Chelsea Hospitals, that the former contains 2710 pensioners, and the latter 509. Of the Greenwich pensioners it is stated that several reach the age of eighty or ninety, but very rarely 100; whereas at Chelsea, out of the smaller number, 509, scarcely a year passes in which some one does not die at 100. This deterioration of life in the sea-service is not now observed for the first time—Sir Henry gives a quotation from Homer, in which he adverts to it in the case of Ulysses; and indeed the appearance of premature old age amongst seamen has often been remarked. Amongst other reasons to which this has been attributed is the broken or interrupted

sleep from night watches, and the artificial kind of life to which the sailor is early habituated; or, as Sir Henry Halford expresses it, the soldier does not commence his military life before his form has developed itself, while the seaman enters upon his duties in extreme youth, his manhood remaining to be perfected on harder fare.

On the subject of stature and of bodily conformation, it may be observed that crowned heads seem in general to have a predilection for men of lofty stature and imposing appearance; and what are termed the household troops in this and other countries consist of men much beyond the average height; but such men frequently owe their superiority to an additional length of limbs, and are often found to have defective chests very disproportioned to the bulk of their extremities. This renders them, particularly in our variable climate, subject to pulmonary diseases. I remember in going round the hospital of the Blues, one of the most splendid regiments in Europe, to have been much struck with the number of men labouring under pulmonary complaints, and was told by Dr. Hair, then surgeon of the regiment, that he scarcely ever lost a man from any other cause. Tall men are said to be more subject to disease generally, and particularly to diseases of the chronic class, than men of a medium size, and they are frequently the first to fail under fatigue. Men of this description therefore are not the most eligible for the general run of military duties; and, "in the present time, when the fate of battle is often decided by fire-arms, to which the hand of a man of six feet gives no more impulse than the hand of a man of five, it is not easy to see the reason of the rule which so generally influences the choice of those who select subjects for the formation of armies."

In judging of the physical characters of recruits, particularly those enlisted at a very early period of life, it is well to advert to the proportions of the skeleton at different ages; a subject on which M. Sue made a series of interesting observations so long ago as 1755, and which has been subsequently noticed by Mr. Shaw and by Dr. Cummin in the London Medical Gazette. It may be observed generally, that in the case of dwarfs or under-sized men, the head and upper part of the body are often sufficiently well developed, and it is in the lower limbs, or inferior half of the body, that the deficiency exists; in remark-

ably tall, or overgrown men, on the other hand, we have the lower limbs for the most part unduly developed, and the trunk, particularly the chest, as already observed, often defective. The standard height in the British service has varied from time to time; and until the present emergency arose, men were not taken under five feet six and a half for the infantry, and five feet seven for the cavalry. With reference to the stature of soldiers, there are some excellent remarks by the late Dr. William Fergusson, in the United Service Journal, where he gives it as his decided opinion, that "he would last longer if the required size and stature of the British soldier were not pitched at too high a standard." Of the inconvenience of adopting a standard disproportioned to the average height of the nation, we have an example in the picture drawn of the Russian Guards, in the United Service Magazine, several years ago.



With a view to determine the most eligible proportions for recruits, I have long been of opinion that the *Andrometer* or man-

measurer might be advantageously employed. This instrument, which is deposited in the museum of the class, and has been shown to many military officers, and to the students of military surgery in this University for a series of years, is the invention of Mr. Macdonald, tailor in Edinburgh. It was contrived with a view to the more accurate and economical cutting of the soldiers' clothing, but is, in my opinion, adapted to other and much more important purposes, both civil and military;—the admeasurement of recruits—the identification of deserters, or of prisoners who may have escaped from justice—and perhaps in some degree to the due allotment of hard labour to criminals—a use of it suggested by some questions put to me by Mr. Hill, the Inspector of Prisons. From an inspection of the marginal sketch, it will be seen that this instrument gives the height of the individual as taken by the common standard; it also gives the girth or diameter of the neck; the breadth of the shoulders, and of the pelvis, respectively; the length of the fork; the comparative length of the thighs and legs, that is, the distance of the knees from the pelvis above, and from the foot below.

Into the physical defects which ought to lead to the rejection of recruits presented to a medical officer for examination, we can only enter very generally; they could not be easily borne in mind individually. Being specified in the printed instructions furnished to surgeons, their enumeration here becomes less necessary; and perhaps I may add that too little is left to the discretion of surgeons on this subject. My chief object at present is to inculcate the advantages of a systematic mode of proceeding in the examination of recruits. This examination ought never to be entered upon when the recruit is intoxicated, a state in which he is not unfrequently presented to the surgeon. He is, of course, to be stripped naked, and examined generally *a capite ad calcem*, both in front and in rear. He is to be made to move about the room, and to extend his joints and limbs in various directions, which will give the surgeon an opportunity of observing any glaring malformation or distortion of the bones or contractions of the joints.

The surgeon is then to proceed more minutely to examine

the head, where, if any obvious defect in its general formation, or any marks of severe fracture, with depression, nodes, exostoses, or tinea capitis are observed, they must be considered as unfitting this individual for the service. All defects in the eye or lachrymal passages, polypi in the nose, malignant tumours in the mouth, extensive deficiency particularly of the front teeth, any appearance of caries in the jaws, either upper or under, are for the most part sufficient causes of rejection. In the neck, tumours, or rigidity of the muscles, with the marks of previous scrofulous ulceration, are the circumstances most commonly met with as causes of incapacity. Distortions of the spine, and original malformations; injuries leading to distortions of the ribs or sternum, so as to affect the circulation or respiration, are decided causes of rejection; as are all indications of a phthisical habit. The measurement of the chest is a practice now universally followed, I believe, by the surgeons of the British army in the examination of recruits.

Much valuable information upon this subject will be found in a work by Dr. Woillez, published at Paris in 1838; and in the United Service Magazine for 1842, we have a table by an experienced medical officer, Staff-surgeon Lightbody, giving the measurement of the chest in 1400 recruits of various ages. The circumference is taken "a little below the nipples anteriorly, and immediately below the scapulæ posteriorly." No recruit, even of the lowest standard, should be considered eligible for the service in whom this measurement is less than thirty-two inches. The average in a full-grown and well-made man is about thirty-four inches. Abdominal tumours, and herniary protrusions of every description, varicose enlargements of the spermatic vessels, and diseases of the testicles, should be considered as sufficient to incapacitate the individual for the service. Distortions of the arms, thighs, legs, or ankles; exostoses, nodes, ulcers, or extensive cicatrices of ulcers; varicose veins, and contractions or rigidity of the joints, are all to be looked upon as causes of rejection. By adopting this systematic mode of proceeding in succession over the head, trunk, and extremities, much time will be saved; any very serious defect can scarcely escape the surgeon's observation; and it behoves him, as he

values his own credit, the character of his corps, and the interest of her Majesty's service, to be accurate and minute in this inspection.

A duty of equal difficulty and importance devolves upon the military surgeon, in deciding upon the cases of men about to be discharged from the service, particularly of such as are to become a permanent charge on the public as pensioners or annuitants. While in the examination of recruits, it is the surgeon's business to see that no man is admitted into the army who is not in every respect qualified for its duties, it must be equally his care to see that no man is discharged as an invalid, or placed upon the pension list, unless positive and permanent disqualifications exist. Here he must be constantly upon his guard, not only against imposition on the part of the soldier, but he must be prepared to resist the importunities of a commanding officer, an adjutant, or the captain of a troop or company, who are often disposed to load the surgeon with the responsibility of discharging a man, possessed, perhaps, of the necessary physical powers, but who may be troublesome, worthless, or unseemly.

Many of the disabilities already enumerated are liable to occur in the common routine of duty; others originate from wounds, and from the vicissitudes of foreign service, to such an extent as to unfit men for active military life. These disabilities are more particularly specified in the instructions furnished to medical officers, and it seems unnecessary to enter more minutely into the detail of duties which must be in a great measure executed according to the established regulations of the service. The instructions which are from time to time issued to medical officers on the passing of recruits and invalids, in so far as they go, must form an implicit guide; but there are still many points which no regulations nor standing orders in this country distinctly provide for. In the writings of Dr. Hennan, of Mr. C. Hutchison, of Dr. Cheyne, and, above all, of Deputy-Inspector Marshall, much interesting and authentic information is contained, applicable to the examination of recruits for the British army, and to the fictitious diseases of soldiers and seamen. Mr. Marshall has made this subject almost exclusively his own. His "Hints to Young Medical Officers of the Army on the Examination of Recruits, and

respecting the feigned Disabilities of Soldiers," and a more recent work on the "Enlisting, Discharging, and Pensioning of Soldiers," contain a fund of valuable information, for which the most experienced will be ready to offer their acknowledgments to the author; there is also a useful little work, published last year by Mr. Massy, on the examination of recruits.

On many of the points thus cursorily noticed, a medical officer may be greatly assisted in forming an accurate judgment by an attentive study of the French "Code de la Conscription," of which an abstract is to be found in the sixth volume of the Edinburgh Medical and Surgical Journal. There is also a "Mémoire sur le Choix des Hommes Propres au Service Militaire," published by Beaupré; an article on the "Simulation des Maladies," in the "Dictionnaire des Sciences Medicales," by Baron Percy; and some observations on this subject in the "Hygiene Militaire" of Revolat, well deserving attention. The many attempts made to evade the operation of the conscriptive laws in France during the revolutionary war, induced the authorities to frame and enact a set of regulations for the guidance of those concerned in examining conscripts, embracing almost every point on which a doubt or difference of opinion can exist.

DIET, CLOTHING, AND EXERCISE OF TROOPS.

The importance of wholesome diet to the preservation of health, and its efficacy in resisting the inroads of disease, are universally acknowledged. The food of a soldier may be coarse, but it should always be wholesome, nutritious, and, I should say, abundant, although a distinguished military writer has dwelt upon the advantages of inuring soldiers to habits of abstemious living. Dr. Jackson observes, that "dignity of mind and real military virtue have no connexion with sumptuous living. The conqueror is ordinarily frugal and homely; the conquered is frequently rich, luxurious, and what is called refined." Our countrymen, it would appear, have long been celebrated for this cardinal virtue in a soldier,

indifference to his fare. Froissart, speaking of "the maner of the Scottis and howe they can warre," observes that "they take with them noo purueyannce of brede nor wyne, for their usage and sobrenes is suche ī tyme of warre that they will passe in the journey a great long tyme, with flesshe halfe sodden, without brede, and drynke of the ryuer water without wyne; and they nother care for pottis nor pannis, for they seeth beastis in their owne skynnes." It is reported of General Wolfe, who was perhaps the most perfect soldier of the age in which he lived, that the cook and butler did not much engage his attention. "He never gave an elegant, and rarely an eatable dinner to persons of the *haut gout*. The epicurean was disgusted; the soldier was regaled. General Wolfe's table was said to be an epitome of a Spartan mess-room—no one rose from it without having been furnished with the opportunity of carrying away a military lesson; and few left it without feeling an accession of military importance communicated to the mind by the impressive influence of a hero's spirit."

In his last work on the "Formation, Discipline, and Economy of Armies," Dr. Jackson has adduced much ingenious argument in support of his views of this subject; and he concludes by observing, that luxurious living places the military character on the brink of destruction; "for," says he, "if there be anything like correct observation among men, it may be confidently asserted that, if high living be the life of the gentleman, it is the death of the soldier." It is obvious, however, that such observations as the foregoing apply only to the luxuries occasionally indulged in by the higher ranks. They can only be addressed with propriety to the officers—to the educated and reflecting part of the army—and habits of abstemious living are so little congenial to the disposition of an English soldier, that he will never practise them when he can do otherwise. My views of the disadvantages of an insufficient diet are, I find, fully borne out by the recent experience of Mr. Alcock of the British Legion, who, in a letter to me, observes that his men, at Vittoria, were literally starved upon their rations, nominally a pound and a half of bread, and a pound of meat; but this, when served to the soldier, after peculations, and diminutions from bone and skin, was often

not more than four or six ounces of solid meat. "This," says he, "is not sufficient, and formed a very prominent cause of a startling mortality."

It is desirable in all cases that the issues of provisions should be as regular as possible in point of time, whether circumstances enable us to render them abundant in quantity or compel us to deliver them with a sparing hand. They should always, if possible, be issued daily; for when three days' rations are issued at once, as is often the case, the soldier is frequently found to devour or waste the whole in one day, and must necessarily starve for the two following, unless he has an opportunity of plundering, to which this very circumstance becomes an additional inducement. We find that the Duke of Wellington was fully alive to the importance of this subject; and in a letter to Sir James M'Grigor, published in his Dispatches, he states that rations were invariably delivered to the soldiers daily; and that the British soldiers carried only three days' bread, while the Portuguese soldiers carried six, and the French soldiers fifteen days' bread.

The soldiers' rations are for the most part so little varied in kind, and so much regulated by the necessities of the case, that it would, I conceive, be out of place to comment on the nutritious properties of different kinds of food; but, with regard to the mode of dressing them, we may observe, that when salted provisions are issued, it becomes an object of considerable importance to have them properly prepared, by being steeped in water for some time previous to their being dressed. We find this practice enjoined by general orders in Knox's American campaigns; and seamen are every day in the practice of towing their salted meat overboard for some time previous to its being cooked. Of the injurious consequences which sometimes occur from ignorance of the mode of cooking salted provisions, a remarkable example, which occurred at Gibraltar, is recorded by Dr. Andrew Marshall, in a thesis, "De Tuenda Salute Militum," published here in 1782. It may be well also to advert to the bad consequences occasionally experienced from too sudden changes in diet, of which an example is given by the late Sir David Stewart, in his History of the Highland Regiments. He states, that in the 2d battalion of the 78th, then recently embodied, and

consisting of young Highlanders, many of the finest looking lads were attacked with "inflammatory diseases, preceded by eruptions on the skin, arising entirely from the quantity of animal food suddenly introduced into the system, previously accustomed to barley and oat meal, or vegetable diet."

Wherever circumstances will admit, great advantages are derived from a regular system of cooking in small messes. We know from experience that soldiers almost uniformly prefer, when they have it in their power, to roast or fry their morsel of meat, and often devour it at a single meal. This is by no means making the most of it. If boiled with vegetables and salt, and made into a wholesome soup, this soup will suffice for a large portion of one meal, while a part of the meat may be reserved, to be eaten cold on a future occasion. "C'est la soupe qui fait le soldat." Soup is always most advantageously prepared in messes; the meat should be well boiled with a proportion of vegetables and salt, whenever they can be procured; and as to the selection of vegetables for this purpose, it is not necessary to be over fastidious; besides the various kinds of cabbage, carrots, turnips, &c., the produce of the garden, there are various kinds of cresses, sorrel, and other vegetables, growing wild in the fields, which make no unpleasant nor unwholesome additions to soup. The fundamental rule of cookery as regards the soldier, consists in boiling slow and in roasting quick. The diet is considered by very experienced officers as by far too insipid and unvaried at present, the cooking rude, and the means of carrying this out both in hospitals and barracks insufficient.

Amongst others, Dr. Dumbreck, who has served much in the West Indies, observes in a letter to me, "It is pitiable to see in all climates the helplessness of our soldiers in regard to this. The negro soldier in the West Indies converts his ration into a savoury and grateful mess, while the white lives on from day to day, swallowing without relish the coarse soup and insipid sodden boiled meat and potatoes, his never changing fare; and, lacking the stimulation and support which a more nutritive and better cooked diet would afford, he falls back on the alcoholic stimulant, the cause of all his misery." The deficiency of our soldiers in the art of cookery, and

in making the most of their limited ration, has often been disadvantageously contrasted with the management of the French, and of other armies; but it is to be hoped that a great and important improvement will soon take place. An accomplished *artiste*, Mr. Soyer, has recently been sent out to the Crimea. His performances have astonished all, and his instructions must be of the most essential service to the hale, and more especially to the sick, soldier. This is not the place to enter into detail; but it will not be disputed that "the best cook in a company or mess—the man who puts before his comrades the most agreeable dinner—will soon arrive at a very enviable distinction."

The practice of breakfasting on tea or coffee has lately become general in the army; and the comfort and advantages of it are, I believe, admitted by all who have thought upon the subject. It was one of the prophylactic measures recommended by the distinguished physicians sent to the assistance of the troops at Walcheren in 1809; and of its beneficial effects upon the health of soldiers under particular circumstances, I witnessed a remarkable instance while surgeon of the 33d regiment. During the prevalence of a malignant fever in this regiment, then stationed in the garrison of Hull, in the autumn of 1817, amongst other measures calculated to check the rapid extension of the disease, I recommended the regular supply of a breakfast of warm coffee to the men. This was immediately ordered by the commanding officer, and nothing appeared, either to the officers, to the soldiers, or to myself, to have so much effect in obviating attacks of the fever. In support of the utility of breakfast messes, Dr. William Fergusson observes, that although the breakfast may contribute little towards bodily condition, it is a more indispensable meal even than the dinner; it is sovereign against all the dangers of the morning, the cold, the damp, the malaria. "It is not, however, a full meal that is required; the slight stimulus of a cup of coffee will allay the call; and for this the poisons of alcohol, opium, and tobacco, have too often been made the substitute." There can be no doubt of the propriety of an evening meal, bread and coffee, or bread and cheese should be provided; the long period between the dinner of one day, and the breakfast of the following one,

must be broken either by food, or the resource in lieu of it, of drink.

The late Dr. Trotter, although much opposed to the general use of tea, admits that there may be conditions of health when tea can do no harm, such as in the strong and athletic; and we are informed, on the authority of two experienced navigators, Captains Forrest and Bowen, that they had uniformly observed, when sailors became fond of tea, they were weaned from drinking strong liquor to excess; and therefore, says Captain Forrest, I encouraged tea-drinking as much as possible, but without assigning my reason for so doing. No breakfast is, I believe, so generally acceptable to English soldiers and seamen as tea or coffee; and those who declaim against the supposed relaxing qualities of these beverages, may be answered in the words of Sir Gilbert Blane:—"I would ask," says he, "whether British courage and hardihood appear, in the late exploits by sea or land, less splendid than at Cressy or La Hogue? whether there is to be found in the results of the battles of Trafalgar and of Waterloo any proof of British nerves being unbraced by the habitual use of this beverage? and whether the physical and moral energies of our officers and men will not stand a comparison with those of their forefathers, or of their enemies, neither of whom were drinkers of tea?" In the introductory observations to the Statistical Reports on the Health of the Navy will be found some valuable remarks on the improved diet, and the restricted use of liquor, which have latterly been introduced into the Royal Navy, and this, contrary to anticipation, "without disturbance or general complaint." The odium which has lately fallen upon the authorities for sending out raw coffee to the Crimea, where fuel was wanting to roast it, will no doubt prevent the recurrence of a similar evil in future.

Before quitting the important subject of diet, it may be well to offer a few remarks on the intemperate use of spirits, which has at all times proved such a bane to the British service. Of the destructive effects of dram-drinking on the health of soldiers, we have a remarkable instance noticed by Dr. Rollo, who states that in the year 1789, the 45th regiment, then stationed in Grenada, lost, within a very few weeks, twenty-six men out of ninety-six sick, and of such of these as were opened, the whole

were found to have ulcerated intestines; and fourteen of them had abscesses in the liver. The circumstance was the more remarkable, as the island was at that time considered healthy; and, upon an investigation into the causes of the mortality, one was particularly remarkable—the common breakfast among the men was a glass of raw spirits, with a small slice of broiled salt pork, the spirits being not unfrequently repeated during the day.

It is chiefly, indeed, upon foreign service that the ruinous consequences of excesses amongst the soldiery are conspicuous; and perhaps there is no situation where it is seen in a more deplorable shape than in the remote quarters in India. There, as well as upon other foreign stations, it was until lately not only the practice, but the positive duty of a soldier to drink his allowance of spirits, amounting to nearly half a pint daily; the habit of dram-drinking being thus engendered, the men were induced to straggle to a great distance from the camp or cantonments in search of liquor; they obtained it of the very worst description, and when in a state of brutal intoxication from its influence, they often lay exposed to the sun, to the parching land-winds, or to the night-dews, all fertile sources of disease in that climate; and they were also not unfrequently, in such circumstances, subjected to the ridicule, insults, or maltreatment of the natives. Individuals are to be found in every regiment, to whom the words of Bishop Berkeley, *mutatis mutandis*, are sufficiently applicable:—"Albeit there is in every town or district in England some tough dram-drinker set up as the devil's decoy to draw in proselytes." And how successful these decoy-ducks are in the army, the numerous instances of madness, of maiming, of murder, and of suicide, which occur on some foreign stations, and particularly in India, afford melancholy proofs.

With a view to the abatement of the baneful intemperance of the army, various suggestions have been offered—the exclusion of spirits from the ordinary canteens—the conversion of these into suttlers' shops—the institution of savings banks, and of temperance societies. Although not very sanguine in my expectations of success from the adoption of these measures, yet it is quite obvious, that while habits of intemperance were fostered by the daily issue of spirits, no rational hope could be

entertained of checking the abuse. The abolition of an indiscriminate issue of spirit-rations to soldiers on ship-board and on foreign stations, through the meritorious exertions of Lord Hardinge, when Secretary at War, has removed one of the most fertile sources of habitual intemperance.

In addition to those local precautions against this evil which are applicable to particular stations, forts, or barracks, I would recommend, as general measures calculated to check this destructive habit, the establishment, in all situations where the abundance and cheapness of provisions renders it practicable, of three meals a day; the frequent payment of the soldiers' balances, daily, instead of weekly or monthly, as used to be the case, by which these balances will be prevented from ever accumulating to a sum capable of supporting any continued course of dissipation; the augmentation of the hospital stoppages on the Indian station to the same amount as in other quarters of the world; the furnishing the men upon all stations with the most approved description of clothing and appointments, calculated to add to their comfort and efficiency, while it tends to diminish the sum of money left at their own disposal. These, and the supply of genuine liquor, where it cannot be altogether withheld, constitute the principal means which a surgeon has it in his power to recommend, or a commanding officer to enforce. In adverting to this subject in a former publication, I hinted my desire of seeing a register of deaths kept in every regiment, calculated to show, amongst other interesting particulars, the proportion which the deaths of the orderly and well-behaved soldiers bears to the drunken and dissipated. This might perhaps eventually be turned to some account, in restraining those excesses so prejudicial to the character, to the discipline, and, above all, to the health of the soldier.

Upon the subject of clothing, I conceive it unnecessary to extend my remarks far. The exterior appearance of troops in their dress and appointments, is considered so exclusively the business of the commanding officer, that the suggestions of the surgeon are not, perhaps, likely to meet with either attention or respect. Nevertheless, occasions do occur, on which defects, either in the quantity, quality, make, or timely supply of clothing, may materially affect the health of the

troops; and in every such case, it falls within the legitimate province of the surgeon to make a respectful representation to his commanding officer on the subject. It has been, somewhat satirically, but too truly observed, that in former times the dress of the soldier was a compound of all that was most inconvenient, a combination of "millinery taste and military error;" and in some excellent papers in the United Service Journal, on the "Errors and faults of our military system," our propensity to borrow everything from the continental fashions is admirably ridiculed. It is there stated that, amongst the multitudes of things we have borrowed, only three are of real value—the cavalry helmet, the gray trousers, and the ankle-boot of the infantry. The covering for the head of the European, and for the foot of the negro soldier, in the West Indies, have been particularly censured by competent judges. With regard to the head-dress of the soldier generally, I may observe that even within my own recollections of the army this has been varied so frequently, and the changes often so trifling, as to lead me to the conclusion that nothing of very striking importance has been established either as an advantage or defect. The great object seems to be to provide a cap, light and not bulky, calculated to protect the head of the soldier, as far as may be, from the stroke of an enemy, and from the extreme vicissitudes of sun and rain. With this view the head-dress should be studied more carefully, and changed, as occasion may require, according to the various climates in which our troops are destined to serve.

The great purpose of clothing in these climates is to protect our bodies from the cold; and the principal objects of attention in constructing the soldier's dress, are to procure a due degree of warmth, while he is not burdened by an unnecessary weight, and to take care that he is not hampered by an undue constriction of his limbs, or cramped in his motions by tight ligatures around the joints. These objects are by no means incompatible with that uniformity of appearance, and that gay *coup d'œil* of a parade so much prized by a military eye; for the part of a soldier's dress in which the surgeon is really most interested, is that farthest from becoming an eye-sore to the commanding-officer—I mean the part of it nearest the soldier's skin. "The experience," says Sir

John Pringle, "which we have had of under-waistcoats during the winter campaign in Great Britain, should teach us to make the same provision for the whole army in any future war. None of the foreign soldiers are without this necessary part of clothing; and indeed no man of the meanest condition abroad. Under-waistcoats would not only be useful in winter-quarters, but greatly so on first taking the field, and towards the end of the campaign." That the above sentiments are perfectly in unison with those of the late Director-General of the Medical Department, may be learned from the following paragraph of his paper on the health of the Peninsular army:—"In whatever climate or quarter of the world a regiment is stationed, the yearly supply of clothing for it should be sent out so as to arrive in due time, and so that the soldier may put it on before the accession of the cold season—that is, before winter sets in in Europe, and by the time the rains set in in tropical countries. The waistcoat is an indispensable part of the clothing of a soldier, and ought never to be omitted. He should have linen trousers to march in, when in a warm climate like that of the Peninsula, reserving the cloth pantaloons for the cold and rainy season. The best clothed were generally among the most healthy regiments."

Some objections have been offered to the general use of flannel shirts as part of a soldier's dress, particularly the difficulty of having the shirt so frequently washed and changed as it ought to be, without which it is perhaps worse than useless. My late learned friend Dr. Trotter, amongst others, objects to the use of flannel shirts in the navy; and with reference to an intemperate order of Lord St. Vincent's, in which he charges the surgeons of the fleet with neglecting the use of flannel from caprice and perverse opposition, the Doctor exclaims, "Clothe the seamen as warm as you please, but in the name of cleanliness give them linen or cotton next the skin!" It seems certain, however, that flannel is extremely useful in preserving those who are exposed to malaria or epidemic influences, and in Dr. Combe's valuable work on the application of physiology to the preservation of health, will be found some striking illustrations of this fact, particularly as it applies to the malaria of Rome. Flannel dresses for sleeping

in have, I believe, been sometimes used by ships' crews as a preventative against malarious exhalations on the coast of Africa.

In some situations my personal experience enables me to vouch for the utility of flannel. Of this we had a very striking proof in the second battalion of the Royals, while suffering from a most aggravated form of dysentery in India. General Conran, the late Lieutenant-Governor of Jamaica, who at that time commanded the Royals, was so fully persuaded of the benefits likely to accrue from the general use of flannel, that he went down from Wallajahbad, where the regiment was then stationed, to Madras, on purpose to represent to the government the distress of his men, and to suggest the expediency of a supply of flannel shirts. This he did with so much effect, backed by the late Dr. Anderson, the Physician-General, that the flannels were immediately ordered, and, in my opinion, contributed much to check the alarming progress of the disease.

I am glad to find that his experience of the recent campaign in the Crimea induces Dr. Dumbreck to express himself strongly in favour of the general use of flannel, and although it will be seen, from what I have already said, that I am not disposed to the hasty or headlong adoption of every foreign fashion, I am much disposed, from the little I have seen of the Turkish habits, to concur in the following observations which his letter contains:—"A dress worn so that the man may breathe freely, and be able to sit in comfort, is a blessing often denied him. I have seen a coatee altered six times so as to fit neatly (tightly ?), and where the sufferer seemed screwed into his trousers.

"The *hood* as proposed by me for introduction into our army, I think an admirable addition to the soldier's dress; every Turkish soldier carries this about with him; it is of strong woollen cloth; two broad straps a yard long each are attached to it; these, when the hood is pulled on, are brought round the jaws, covering the mouth, and forming an excellent protection against inclement weather and malaria."

The comfort of a soldier, it will be easily understood, depends much upon the state of his shoes or ankle boots, and their accurate adaptation to the feet of the wearer. The shoe

with an expanding or elongating sole, patented by Mr. Dowie, is calculated to afford much ease and comfort in marching; and in a paper published in the Philosophical Journal several years ago, will be found certificates from my late colleague Sir Charles Bell and other scientific gentlemen, in commendation of the principles on which those shoes are constructed; but they have never been generally adopted.

In some instances the very mode of cleaning the soldier's clothing has been the means of inducing disease. Thus the cleaning of the white trousers with wet pipe-clay, and putting them on before they are thoroughly dry, is apt to occasion pulmonary or rheumatic attacks, of which I have seen numerous instances. It therefore becomes the surgeon's duty, by his personal remonstrances and representations to the officers, to do everything in his power to check a practice so likely to hurt the health of his men. The use of pipe-clay indeed ought strictly to be confined to the belts, gloves, and other leathern appointments, and ought not to be employed so much as it is in cleaning other parts of the dress. It is at the best, as a facetious friend of mine used very emphatically to express himself, only putting a quantity of white dirt over a quantity of black dirt.

On the subject of personal cleanliness, it might naturally be supposed that few injunctions would be necessary, and that men, even when left to themselves, would take the most effectual means of securing a comfort so essential to their health. Experience, however, teaches us otherwise; and we daily see men whose sloth and dirtiness are such, that neither the immediate comfort arising from cleanliness, nor the ultimate effects resulting from the want of it upon their own health—nothing, indeed, short of actual punishment, is sufficient to ensure a due regard to it. We never fail to observe, both in the army and navy, that those men who are most slovenly in their persons are always the first to suffer from disease. The profuse perspirations induced by active military operations, the quantity of sordes collected about the persons of soldiers by marching on dirty roads, or even going through the evolutions of a field day, are only to be removed by perfect ablution; and for this purpose bathing should be encouraged, wherever circumstances and season render it

practicable. One of the most important steps towards personal cleanliness which the English army has made since I knew anything of it, is the general adoption of cropping, and the consequent abolition of those quantities of powder, soap, and pomatum, with which the heads of the soldiers used to be besmeared. "To live comfortably," says General Maitland, "men must be cleanly. It improves every advantage, and lessens every evil. Cleanliness in the person of a soldier, and in the barracks and hospital, are almost certain indications of a good regiment."

The equipment and accoutrements of the soldier are perhaps too much of a military question to entitle me to enlarge upon them; but much medical opinion has been expressed, and much has been unduly spurned in reference to the slinging of the soldier's knapsack—a measure of no small importance to his health. I have had an endless variety of projects for this purpose submitted to me, and I have only to say, that the best which I have yet seen is that of Mr. Berrington, of which a full explanation was published in the "Lancet" some four or five years ago.

The benefits which accrue to health from habits of exercise are so well understood, that it is surprising to find strong prejudices sometimes existing upon this subject; some officers in the army, although disposed to take plenty of exercise at their own time, and in their own way, are quite unable to see the utility or advantage of being summoned at an early hour in the morning to parade for drill along with the men. They will contend that these drills, so unpalatable to themselves, are injurious to the health of the soldiers, and broadly hint that it is the surgeon's duty to represent this to the commanding officer; but I have always been excessively slow of conviction upon this point, being decidedly of opinion, with Sir John Pringle, that "although a soldier is occasionally liable to great fatigue, the most frequent error of people of that class, if left to themselves, would be on the side of rest."

Connected with this subject, the rate of marching is a point of very considerable importance. A rate of from three to three and a half miles an hour, will perhaps be found the most eligible pace in all climates. I have been much pleased to find my own views on this point strongly confirmed by a

recent authority—Dr. Kennedy of the Bombay army—who, in his interesting "Campaign of the Army of the Indus," observes, that "when the soldier has from fifty to sixty pounds weight to carry, a distance of twelve or fourteen miles to march, and a solar temperature above 100° to bake in, the shorter the time he is about it the better." It is in my opinion an erroneous practice, as was the custom during my service in India, from fear of exposure to the sun, to move off the troops from their ground at two or three o'clock in the morning, sometimes even earlier. Their sleep was thus broken, and the march accomplished in the dark, frequently over bad roads, or no roads at all, sometimes steering by a compass at the head of the column, was necessarily protracted, was attended with great additional fatigue, and not without risk to the limbs of individuals. An hour's more sleep, and an hour's more daylight, even at the expense of an hour's more sun, was the maxim which I endeavoured to inculcate.

The Romans, who owed more to the discipline of their armies than any nation upon earth, were extremely rigorous and persevering in their exercises. They practised their soldiers in every species of service that might occur, so that nothing at any time happened with which they were unacquainted; and actual war was in reality a time of relaxation to this enterprising people. The Romans were not only sensible of the advantages which those habits of exercise procured them in action, but had also the penetration to discover that they were eminently serviceable in the preservation of health. We learn from Vegetius, that the Roman soldiers were exercised daily in the Campus Martius when it was fair weather, and under cover when it rained or snowed; and this author adds a remark, by no means flattering to the members of our profession, *Rei militaris periti, plus quotidiana armorum exercitia ad sanitatem militum putaverunt prodesse, quam medicos.*

While troops are conveyed in transports to foreign stations, the general orders direct that, when the weather will admit of it, they should be frequently drilled on deck in the open air, and that such amusements should be encouraged as are calculated to keep them in exercise. It is of consequence also, that

troops coming to a climate different from their own should be somewhat habituated to it before they enter on the fatigues of service. New levies, or regiments having many recruits, should, if possible, be first sent on garrison duty. Recruits by this means attain the habits of soldiers, and are inured to the climate and peculiar service before they enter into all its fatigues. While stationed in such garrisons, they should be fully exercised as preparatory to the duties of the field. The superiority of seasoned men will be easily understood. It is repeatedly adverted to by the Duke of Wellington in his Despatches; and upon one occasion, in a letter to Lord Bathurst, dated from Lesaca, he declares, that in that country, particularly, one old soldier was worth at least five new ones.

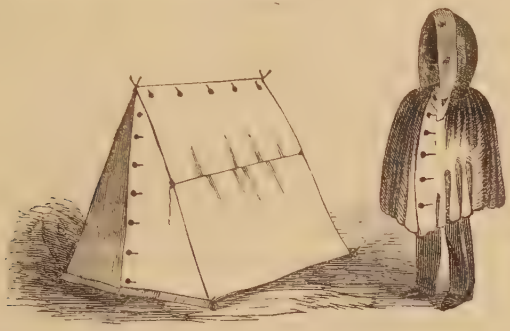
Sir James M'Grigor gives some very striking illustrations of the advantages which seasoned men possess over recruits in going through the fatigues of a campaign; and states, that from the 19th of August 1811 to the 20th May 1812, the 7th regiment lost one hundred and sixty-nine recruits out of three hundred and fifty-three landed in the preceding June; while in the same period it lost only seventy-seven out of eleven hundred and forty-five old soldiers. The 40th regiment lost, during the above period, one hundred and four recruits out of four hundred and fifty landed in the preceding July, and only fifty-six out of eleven hundred and seventeen old soldiers; yet no regiments on that service were more ably commanded or better officered than the Fusileers and 40th regiments.

It would be easy to enlarge here on the importance of exercise as a branch of military education, but my remarks must be limited to what is needful towards preserving an army in health; and without specifying more minutely the exercises or amusements which ought to be encouraged, it may be observed, that walking, running, leaping, swimming, wrestling, and fencing, are exercises often useful in the actual practice of war.

ACCOMMODATION OF TROOPS IN CAMP, IN BARRACKS, IN BILLETS.

Of all the circumstances connected with a camp, the most important is its site. The experience of all ages has proved, that the neighbourhood of marshes, grounds subject to be overflowed by large rivers, surrounded with foul stagnating water, or low places covered with wood, are most injurious to health; and the noxious effluvia arising from these situations are augmented in proportion to the heat of the climate, or the season of the year. Hence such neighbourhoods become more dangerous for encampments in tropical regions, and in our own country during the heats of summer and of autumn. The danger of such situations is also in some degree dependent upon the temporary or permanent nature of the establishment we have in view. Thus ground may sometimes be taken up for a night's residence, which would be very ill adapted for a permanent station. For the movable camps of India, where the army encamps at the end of every day's march, and often changes its situation daily for months in succession, positions are occasionally taken up which would be ill adapted to the stationary camps sometimes formed in this country, still less to an entrenched camp, or to a barrack. Tents vary much in their construction and accommodation from the spacious marquees, sometimes in use by the native chiefs of India, or by general officers, to the common bell-tent of the men. The present campaign has brought under general notice the Tente-abri of the French, heretofore unknown to our army, which seems a most handy equipment, as sketched in the woodcut. It is described as three feet high, four and a half long, and is composed of three pieces of canvas, attached by buttons or strings. Two sticks placed at each end serve to support it, and it is fixed by wooden pins to the earth. Three minutes suffice to set it up, and two to take it

down. Each tent accommodates three men ; each of the three carries a piece of the canvas ; they divide the sticks and pins amongst them, and so they march.



When necessity compels an army to encamp on wet or marshy ground, every effort should be made to render it as dry as possible, by means of drains cut across the field and round the tents. Wherever circumstances permit, an abundance of straw, ferns, or heath, should be furnished to the men, to be interposed between their bodies and the ground, when lying in their tents ; and when a camp is inevitably situated near a standing pool or marsh, that side of the tents, marquees, or huts, which faces the marsh, should be closed as much as possible, and all the openings, windows, and doors, should be made on the opposite side, in order to shun the ill effects of the exhaling vapour. The situation of a camp must sometimes be regulated by accidental circumstances, over which the opinion of a medical officer can have little control ; but whenever a choice of the ground for encampment is submitted to professional opinion, it will be proper to recommend a dry elevated situation, remote from marshes, swamps, stagnant waters, and from the immediate neighbourhood of orchards, forests, or underwood, which are calculated to retain moisture.

A camp is most advantageously situated on a gentle declivity, on a dry soil, and in the vicinity of a running stream. In order to ascertain the state of the ground, it may sometimes be necessary to dig into it to some extent, for although apparently dry on the surface, it may be found sufficiently wet at the depth of a few feet ; and if so, ought, if possible, to be

changed, particularly if an encampment is to be stationary. A camp should never be formed on ground recently occupied, nor on a field of battle where much carnage has recently occurred. Many favourable spots are to be found on the banks of rivers, which, perhaps, upon the whole, afford the most eligible sites. We must yet bear in mind, that when the banks of the river are low, or the country subject to periodical rains, or sudden inundations from the melting of snow on contiguous mountains, there may be a very serious danger from this cause. Against the danger of such a position we are cautioned in Mezerey's "Médecine d'Armée," where he states a case in which the Austrian army lost 500 men and 200 horses, from a sudden inundation of this kind.

When an encampment is inevitably situated in a low or unfavourable position, the kindling of large wooden fires in the windward part of the camp is recommended by Mindererus in his "Medicina Militaris," as contributing to preserve the health of the troops; and with the same view discharges of artillery and bonfires in the streets have sometimes been adopted in sickly garrisons, for the purpose of purifying the atmosphere; but the heat which they occasion and the alarm which they create amongst the sick, render their efficacy very questionable. Various modes of ventilating tents have been recommended, some of which are described in a little work, entitled "The Soldier's Friend," by Mr. Blair, formerly surgeon of the Lock Hospital in London; but as none of these plans have ever come into general use, nor indeed have been found requisite, it is unnecessary to enlarge upon them here. The most obvious and perfect way of thoroughly airing the tents is by striking them occasionally, and exposing the straw, blankets, and soldier's clothing to the open air; the necessity of frequently changing the straw, and enforcing cleanliness in camp in every possible way, are circumstances too obvious to require any effort of reasoning to enforce. With this view, the slaughtering of cattle, and every thing likely to create noxious or putrid effluvia, ought to be conducted without the camp, and on the side of it opposite to that from which the wind generally blows.

Notwithstanding every precaution, filth is apt to accumulate in camp, and consequently stationary camps for the most

part soon become unhealthy. In such circumstances, it is consonant to all experience, that the most effectual step has always been a change of ground—a measure distinctly recommended by Vegetius:—"Si autumnali æstivoque tempore diutius in iisdem locis militum multitudo consistat, ex contagione aquarum et odore ipsius fœditatis, vitiatis haustibus et aëre corrupto perniciosissimus nascitur morbus, '*qui prohiberi non potest aliter nisi frequenti mutatione castrorum.*'" Whenever, therefore, a camp becomes offensive or unwholesome, from the accumulation of filth, instead of trifling or inefficient attempts to remove the nuisance from the camp, the proper remedy is, if possible, to remove the camp from the nuisance, and to take up a position to windward of the ground formerly occupied. For the accommodation of the sick in camp, the general regulations enjoin the propriety of obtaining, if possible, an adjoining house for their reception; and where this cannot be procured, every exertion is to be used to render the hospital-tent dry and comfortable. A trench should always be made round it, and the floor boarded with deals when these can be procured. In Macrae and Renny's account of the arrangements for the medical service of Lord Gough's army in the Punjaub War, may be seen a sketch of the splendid camp equipage generally provided for our Indian armies.

While the foregoing considerations demand serious attention in judging of the site of camps, similar views will naturally influence our decision in recommending a site for the erection of barracks; but here every consideration naturally becomes more important in proportion to the expense, the durability, and the permanence of the establishment. Barracks well situated, well ventilated, and kept thoroughly clean, are eminently calculated to promote the health of troops; and in no other situation do we find soldiers, in general, so exempt from disease, while at the same time their concentration in these establishments facilitates their training, and effectually subjects them to the surveillance of their officers. Dry, elevated situations, with an abundant supply of wholesome water, remote from the neighbourhood of swamps and of marshes, are the positions which a regard for the health of the troops would naturally induce us to select as the most eligible situations for the construction of forts and of barracks; and it so far fortu-

nately happens that the erection of these buildings on high or elevated situations may often be conducive to the defence of a country.

From Dr. Price's calculations, there is reason to believe, that, in hilly districts, half the numbers born live to the age of forty-seven, and that one in twenty reaches so far as eighty years of age; while in marshy districts one only in fifty-two attains that period of life, and only one-half the numbers born survive to the age of twenty-five. Nothing can more forcibly point out the advantages of elevated situations, and the fatal tendency of low ones, than the foregoing statement; and whenever a country is taken possession of by troops with a view to its permanent occupation, they cannot be too forcibly pressed on the attention of those in command.

Previously to the erection of forts and barracks, or fixing the cantonment of troops, a professional survey should be made by a committee of military and medical officers, so that the advantages and disadvantages of the situation may be fairly and fully estimated, and stated to the commanding officer. From a survey of this nature it is scarcely possible but that such information will be obtained as may enable those entrusted with the direction of affairs to combine defence and convenience with a due regard to the preservation of health.

The plan of assembling a board of health on the arrival of troops in a new or unknown country, first recommended by Dr. Jackson, is very strenuously enjoined by Dr. Millingen in the "Army Medical Officer's Manual," where he has inserted a very judicious list of queries for the investigation of such a board. These queries, although all highly important, are too numerous and minute to enable me to enter into their enumeration here. The chief topics which they embrace are, the qualities of the soil, and the nature of its productions; the usual diseases of the country; the particular districts or provinces in which they are found most destructive; the seasons of the year, and the particular winds which are reckoned most unwholesome; the particulars as to diet, mode of living, and temperance of the inhabitants, which are supposed to influence their health; and the modes of practice followed by the resident physicians.

Upon all these subjects much important information may be obtained from the old residents, or from the native medical practitioners of a country, provided they are not hostile to our views, and under temptations to deceive us—a circumstance which should always be most cautiously guarded against. Native practitioners, if so disposed, may be enabled to point out, in almost all countries, particular spots, sometimes indeed of a very limited extent, which have, by a long train of observation, been found hostile to the human constitution, and which, of course, are to be avoided either for the temporary or permanent residence of troops.

The importance of a due attention to the locality of barracks is well exemplified in the following extract from the well-known work of Johnson and Martin on "The Influence of Tropical Climates on European Constitutions:"—"The buildings for the troops at Berhampore in Bengal, which were abandoned for the unhealthiness of the station in 1835, after an occupation of seventy years, are said to have cost, first and last, including principal and interest, the enormous sum of sixteen millions eight hundred and ninety odd thousand pounds," while the annual ratio of mortality at this station, during thirteen years of the last century, was nearly one hundred per thousand, and during twenty years of the present century was not less than one hundred and two per thousand —a proportion "to shock even the humanity of governments."

In many instances the locality is not the only cause of sickness and mortality amongst the troops. Mr. Martin observes, that "in Calcutta, Dinapore, and, I may say, in three out of four of the stations throughout India, the locality and the construction are equally faulty, so as to constitute an enormous public evil." With a view to obviate this in future, he proposes, that a standard plan for the erection of barracks and hospitals adapted to the various stations in which our troops are destined to serve, should be formed by a committee of engineers and medical officers, experienced in their respective departments. This ought not to be a very difficult task, when we consider that the same, or a similar plan of barrack and hospital accommodation, would serve for the West Indies, India, Ceylon, and China; another perhaps for Gibraltar and

the Ionian Islands; a third for Australia and the Cape; while plans for this country and Canada ought to be very easily adjusted.

This excellent suggestion, which was submitted to the late General Sir George Murray, and handed in at a meeting held at the Colonial Office in 1842, at the request of Lord Stanley, now Earl of Derby, has not been as yet acted upon, and consequently no established plan has been adopted for the construction of barracks either at home or abroad. The temporary wooden barracks erected in many of our provincial towns during the continental war, presented considerable uniformity in their general features, and also in their defects —the principal of which, so far as my recollection serves, was a want of sufficient space in the passages, lobbies, and staircases, and an insufficient elevation in the ceilings of the rooms. The cavalry barracks in this country are generally so constructed as to have the stables below and the dormitories or apartments for the soldiers above—an arrangement so far advantageous by elevating the men from the ground floor; but these barracks for the most part have the same defective elevation of the ceilings as the infantry barracks. The cubic space allotted to individuals in barracks varies of course with the number of men placed in them; and although we have a minute return from all the barracks in the United Kingdom, printed under the authority of Parliament in 1847, containing many important particulars, and specifying the number of men, women, and children usually occupying each individual room, yet the amount of cubic space, or, in other words, of air apportioned to each person, is most unaccountably omitted, and cannot be ascertained without a tedious and troublesome calculation for each separate apartment.

Looking to this question as regards the allotment to patients in hospital, which I have carefully studied, looking to the additional space obtained in a barrack-room by the necessary absence of some of its number on duty, or in hospital, and to the benefit which they all derive from passing much of their time in the open air, I am inclined to think that 500 or 600 feet would be a reasonable allowance. A regulation exists, I am told, specifying 500 and odd feet as the space allotted to each individual; but this I apprehend is very imperfectly followed

out, and where it exists it is rather the exception than the rule. In the erection of barracks within fortresses or in garrison towns, the usual materials of the country, stone and lime, or brick, are naturally employed, and in the temporary barracks formerly alluded to, wood was the principal material; but I am satisfied that iron, noticed again with reference to the construction of military hospitals, might often be advantageously substituted. I have recently inspected a building of this kind on an extensive scale erected by Mr. Young of this city, an eminent and enterprising manufacturer of iron wire fences, gates, and agricultural implements. This iron house is 250 feet long, 60 feet wide, and 25 feet high in the walls. It affords accommodation, forges, benches, &c., for upwards of 200 workmen, who are constantly employed in it. The pillars and frame work are partly of cast, and partly of malleable iron; while the pannels are of sheet-iron, corrugated or plaited somewhat like the frill of a shirt, so as to render them inflexible, and to give the walls of the house an almost incredible power of resistance. A single glance at this fabric will show how admirably it is adapted for a riding-school, an indispensable appendage to a cavalry barrack, or to a gymnasium, which would be a valuable appendage to all our barracks. I am told that it may be constructed for about one-half of what a substantial building of stone and lime of the same dimensions would cost, and Mr. Young will engage to take the whole to pieces and reconstruct it in a few weeks, or even less.

In the construction of barracks, respect must always be had to the peculiarities of the climate; and in the second volume of the Papers published for the use of the Corps of Royal Engineers, we have some valuable suggestions by Sir C. Smith, Captain Brandreth, and others, for the construction of barracks for tropical climates. The two great objects in all cases to be kept in view are the means of *thorough ventilation* and of *perfect cleanliness*, and with a due regard to these, the minor arrangements may be submitted to the skill and experience of the scientific and accomplished officers of the engineer department; but upon the subject of ventilation, so immediately and so essentially affecting the health of the soldier, a few remarks may be offered. Ventilation implies a constant removal of the foul and frequently respired atmos-

phere, and the introduction of a fresh supply of air, without exposing the inhabitants of an apartment to violent and irregular draughts or currents. The indispensable necessity of this kind of ventilation in all inhabited buildings, but especially in those where numbers are collected, is so perfectly known, that it would be superfluous to enter upon it here, were it not to advert to some errors in the common practice upon the subject, and to point out the means of obviating them. To ensure a due and regulated supply of air requires some address, for ignorance is as frequently conspicuous in its introduction as in its exclusion; and when left at the discretion of capricious, unthinking, or uncontrolled individuals, bad consequences often ensue. The class of society from which soldiers and their wives are taken have an incorrigible aversion to the free circulation of air—a circulation which is rendered more necessary for them than for the higher ranks, in consequence of their less minute attention to personal cleanliness.

The essential part of the mode of ventilation which I would recommend, is to convert the passages, lobbies, and staircases of a barrack or public building into spacious air trunks, or reservoirs, communicating directly with the external atmosphere, and supplying the rooms adjoining them on either side, both by means of the doors opening into such passages, and by means of additional apertures made for the special purpose of ventilation. Thus at either extremity of the passage, there should be a window reaching from the ceiling to the floor of each storey, the upper part capable of letting down, and the lower of lifting up, so contrived, however, as not to shut perfectly close at either top or bottom, but to leave a slit or aperture at least two inches wide, forming at all times a direct communication with the external atmosphere; and in fine weather these passage-windows may remain open to any extent, giving the most unlimited access to the external air. In the floor of each passage one or more apertures should be made of at least two feet square, covered with strong iron gratings, and in the roof a properly sheltered aperture or penthouse, so as to admit the escape of the air outwards, while it effectually prevents the entrance of snow or rain.

By this direct and perfect communication of all the passages with the external atmosphere, as well as with each other, a constant supply of pure and unrespired air will exist within the building. To place the passages thus prepared in action as ventilators, there should be placed over each of the doors opening from them into the adjoining apartments, a Venetian window reaching to the ceiling, while the door itself should not reach within an inch of the floor; but the principal dependence for a uniform supply of air should rest on means independent of the ordinary openings, and may be effected in the following manner. Into each room, on a level with the floor, let apertures be made of six or eight inches diameter, and from ten to fifteen feet distant from each other, communicating with the passage or main air-trunk; and the same description and number of apertures may be made close to the ceiling corresponding with the unbored spaces of the lower range of air-holes. This upper row of perforations to be conducted through the exterior wall of the building, communicating directly with the external air; or, what is better, tubes, or air-channels, may be carried along under the ceiling, and made to communicate with the [illegible] the chimney. By this means we provide for a constant sup[illegible] unrespired air from the passages or reservoirs by means of the lower range of perforations, while the respired and heated air is permitted to escape by the upper range.

In a room thus ventilated, the inhabitants are not exposed to direct currents of wind striking upon their bodies, for the entrance of the fresh air is below their sleeping places, while the exit of the foul air is above their heads. The heated and rarefied air escapes upwards, while that which occupies the lower part of the room will be constantly diluted and refreshed with unrespired air; indeed, the more the atmosphere of an apartment thus ventilated may be heated by respiration, or otherwise, the more certainly will a circulation of air be established through it; and the superiority of this plan over that where the ventilation depends chiefly or solely upon windows placed at the ordinary height from the floor is obvious, for they operate directly only upon the purest part of the air of a room, viz., the middle layers.

A great advantage of this plan of ventilating, which is

more fully detailed in my introductory lectures published many years ago, is, that it does not interfere in any degree with the means already established, and that it may be introduced at a very trifling expense into buildings already erected for barracks, or occasionally occupied as such. But the great and leading advantage which attends the mode of ventilating barracks by means of the air occupying the passages and lobbies is, that we have the supply completely under the control of the military or medical officer at all times and in all seasons, constantly existing within the building itself, let the storm rage how it may without.

Before concluding the subject of ventilation, I have only to observe, that the mode of ventilating barracks by perforations in the walls and passage floors, is merely a modification or extension of the plan of ventilating hospitals recommended by Dr. Donald Monro, in his "Health of Soldiers," so long ago as 1762; and of its practical utility, examples are, or at least were, to be found in the Bristol Infirmary, fitted up on the suggestion of the late Mr. Howard, and in the wards of some of the barrack hospitals in England. Amongst others which I have seen many years ago, was that at Hastings in Sussex; while in foreign countries, several examples were to be found of barracks, hospitals, and workhouses ventilated in the same way; thus the Caserne of St. Elizabeth at Brussels, the hospital of the Jesuits in the same city, and the workhouse at Amsterdam.

In guard-houses, which are frequently crowded with prisoners, and consequently overheated, and which are furnished with fixed bed-places that do not admit of a free circulation of air under them, perforations on a level with the floor and with the ceiling should never be omitted. The same should be introduced into black-holes, and other places of confinement, which frequently prove sources of much more severe punishment than they were ever intended to be. In barrack necessaries, the due admission of air is seldom sufficiently attended to by architects, insomuch that offensive and noxious vapours are accumulated and retained, while the detection of the most palpable filth is but too often rendered difficult by the want of a sufficiency of light. In cases where it is necessary, for the sake of admitting light, to have win-

dows opening into close or inaccessible areas, it would be well that such windows were invariably placed at such a height from the floor, and so grated over as to prevent dirty or indolent soldiers from throwing out filthy or offensive matters into places whence they cannot easily be removed.

The plan of dry scrubbing, for cleaning the floors of barracks, has now, in this country at least, very generally taken the place of the practice of frequent washing in all weathers, which formerly existed, and which in many instances was found injurious to the health of the soldiers; but there are certain circumstances under which washing with soap and hot water, or scouring with sand, may still be requisite. In warm climates, where vermin, and particularly fleas, are abundant, frequent washing is perhaps a necessary resource. Mr. Alcock tells me, that in the large hospital at San Telmo, in Spain, containing six hundred beds, he had each division scrubbed with water every morning at day-break during the summer months, to the manifest comfort of the patients, who were thus kept free from vermin; greater cleanliness and coolness was obtained, and no bad result was observed. By the general introduction of iron bedsteads into barracks, cleanliness has been essentially promoted, and ventilation improved; for those cumbersome wooden bedsteads formerly in use not only obstructed the circulation of air, but even materially diminished the cubital bulk of it contained in a room. In rooms perforated as I have proposed, the bedsteads should be placed relatively to the perforations, in such a manner that the air beneath them should be constantly changing, and its current directed along the floors and walls. This may be done either by placing a bedstead over each air-hole, or where an air-hole comes in the interval between two beds, placing a slip of board or sheet iron before it, in such a manner as to force off a portion of the air laterally; and the bedsteads should always be placed at a few inches distance from the walls, and never huddled together, or forced into corners and recesses as they sometimes are.

The white-washing of barracks and hospitals is a subject of considerable importance, and I have often seen occasion to regret the obstacles to its accomplishment; the delays and

difficulties in getting the work commenced; the tedious and slovenly manner in which it has been proceeded with; the insufficiency with which it has been performed; and the unnecessary expense to the public with which it has been attended. In a much shorter period of time, and at an expense much below the usual estimates, barracks and barrack hospitals might be effectually white-washed by employing soldiers for this purpose, to whom the necessary materials should be furnished; and in the case of hospitals, a charge for brushes, lime, &c., might be allowed in the hospital accounts, thus enabling the surgeon to have his hospital white-washed, without a moment's delay, whenever it may become necessary.

In proof of the superiority of barracks to every other accommodation, as connected with the health of troops, the following passage from Dr. Brocklesby's "Observations on Military Hospitals, and on the Diseases of Soldiers," may be adduced:—"The general use of barracks," says he, "is a subject of so great importance, that it cannot be sufficiently enforced. How is it possible for the men of each company, scattered up and down the ale-houses of a great town, ever to be regularly messed together? How is it possible without barracks to make a private soldier always wholesome and cleanly, farther than at a stated hour on the parade for momentary show? The day of battle is once or twice in a long campaign, when men must be used as they are wanted; but an attention to the well-being of the men, and the preservation of their health, ought to be a constant serious business, and an unceasing care of their officers, as well as of the doctor."

While he thus urges the establishment of barracks on the most honest and humane of all principles—"the necessary care of men's lives"—he deprecates the construction of some of the older barracks in this country, "built with salt-water bricks, and fitted up with low ceilings, and without ventilation. Such barracks," says he, "are worse for the inhabitants than any tolerably clean king's ship riding at anchor in harbour or at Spithead." These observations of Dr. Brocklesby will shew what just opinions this distinguished physician entertained of what was most objectionable in the construction of barracks; and how far they are calculated, when well

constructed, to promote the comfort, health, discipline, and efficiency of the troops.

Connected with the subject of barrack accommodation, is the practice of hutting, hitherto almost unknown to the English army, indeed, I may say, less known to it now than it was many years ago. It is little short of half a century since I passed a winter in a hut, in a very exposed situation at Bexhill, near Beechy Head, on the coast of Sussex. The huts then occupied by the Royals had been constructed by the German Legion, at that time in the service of the Crown, and who had preceded us in that quarter. They were partly formed by excavation, sunk some feet below the surface of the ground; and the walls, so far as I recollect, were, in some of them, raised of turf, in others, of wooden planking. Of the officers' huts, each contained two apartments, of which I occupied one—and as a young man of twenty years of age, I thought myself most admirably lodged. I had, since I became resident in Edinburgh, a sketch of one of these huts presented to me by a pupil who came from that part of the country; but it does not altogether correspond with my recollections, and I therefore decline to print it. The great object in all such erections is to make provision against damp; and in so far as one can judge from the reports of those erected in the Crimea, and from the sketches of those now erecting at Aldershot, this would seem to be guarded against, by raising the whole above the surface of the ground. Whether the best material be wood or iron, is yet to be determined—the former is unquestionably the more generally accessible—but the latter, whenever it can be procured, appears to me, independent of other considerations, the least likely to afford lodgement for damp or moisture. This, as I have already hinted, is the great evil to be obviated, for in tropical climates, when moisture is combined with heat, it inevitably gives rise to fever and dysentery; in this, and in similar cold climates, it is equally productive of rheumatism and pulmonary complaints.

Of billets, the next means of accommodation for the soldier, nothing favourable can be said, in so far as the health of the troops is concerned. They remove the soldiers in a great measure from the wholesome surveillance of their officers;

they give them opportunities of indulging in dissipation, and throw them in the way of many temptations to which in a barrack they are not exposed; they lead to relaxation in discipline highly prejudicial to the health of a soldier, and to neglects and oversights when sick, sometimes attended with the most fatal consequences. The distress to the individual, the disadvantage to the surgeon, and the injury to the service which attends the billeting of soldiers, seems to have been severely felt, and are pathetically lamented by Dr. Hamilton in his work on the "Duties and Qualifications of a Regimental Surgeon," published in 1787. "The billets in England, and, I may add, in Scotland, are always in public-houses; and the landlord never fails to look on the soldiery not only as a nuisance, but as a great drawback on the profits of his business. They are treated coldly, and frequently lodged poorly. The places allotted for them are generally some uninhabited garret or lumber-room, where the very air they are obliged to breathe is so vitiated as at first entrance considerably to affect a person unaccustomed to it. It must be obvious that this will affect the surgeon in his practice, for we need not add, that while the cause exists the disease must continue. The most judicious plans of practice may be laid down, but, under such circumstances, it will be next to impossible that they can prove successful."

It is to be wished that more recent experience would enable me to give a different picture of the disadvantages attending the billeting of soldiers throughout England; but these, as portrayed by Dr. Hamilton, are in every particular perfectly coincident with my own observation; and of the fatal consequences which sometimes occur from the practice of billeting soldiers, one of the last cases which I had occasion to treat in the service afforded a melancholy example. A fine healthy young soldier of the 33d Regiment, then occupying billets in the town of Nottingham, was severely injured in a drunken brawl, and received several contusions on the head. He was brought to the hospital, labouring under violent symptoms of phrenitis, which, in spite of very active treatment, proved fatal in a few hours after his admission. On examining the head, the cause of his death was sufficiently conspicuous, a considerable quantity of matter having already

formed on the surface of the brain; but I was extremely puzzled to account for the rapid termination of this case, until the circumstances were developed before a coroner's inquest, when it turned out that the fatal injury had been received several days previously to his appearance at the hospital; and that his comrades, and the people in his billet, desirous of hushing up the whole affair, had kept him concealed, and had been treating him with hot ale and gin. To this a facility was unfortunately given, from the young man having been employed in manufacturing tufts for the men's caps, and having in consequence been excused from parades.

Billets, however, notwithstanding the objections I have pointed out to them, become in many cases the only accommodations to be procured for soldiers; and, in such cases, it is the duty of the surgeon, as far as his more urgent avocations will allow, to visit the different billets of his men, particularly such as may be reported to him as damp, deficient in point of ventilation, cleanliness, and comfort; and when he finds them so, it becomes his imperious duty to make an immediate and distinct report to his commanding officer on the subject.

Having offered these cursory remarks on the accommodation of troops, it now only remains for me to advert to what may be attempted for their comfort in those urgent circumstances in which they are totally without accommodation and without shelter, when they are under the necessity of bivouacking. Here every thing which can reasonably be devised is comprehended in the following extract from Dr. Millingen's Army Medical Officer's Manual:—

"In selecting ground for bivouack, little can be remarked; as it is merely necessary that, in this temporary situation, the site should be healthy, and in the vicinity of wood, water, and straw, if possible. It is in this harassing situation, more especially in cold and wet weather, that hoods attached to the great-coats will be found of material benefit.

"When military circumstances permit it, fires should be kindled; and when a general does not wish to show an extensive front, they should be lighted in circular clusters, that the men may lie between them, and the heat be more generally diffused; amidst these, the troops should lie, not singly, but

by squads, spreading two or three blankets on the ground, over straw or fern leaves, &c., when they can be procured; their heads covered with their hoods, their ears previously protected by the flaps of their forage-caps; their feet converging towards the fire; their heads supported by their packs. They should lie close to each other, covered with the rest of the blankets; in wet and cold weather, a half ration of spirits should be issued previous to their retiring to rest.

"In very cold weather sentries should only be kept on an hour, or even half an hour; and when relieved the men should not be permitted to lie down immediately by the fires, but be kept pacing round them till the sensation of numbness is relieved. Under similar circumstances, only one-half of the troops should be allowed to lie down at a time, the other half being kept in motion round the fires, with orders to awake their comrades after two hours' sleep, that they may rest in their turn.

"When sleeping on the snow-covered ground, the men had better pile up a heap of snow on each side of them. These banks will afford a comfortable protection. Under these circumstances, incredible comfort will arise from anointing the face and ears with oil before retiring to rest or going upon duty.

"On arriving on the bivouack ground, the sick should be put under canvas, or accommodated in adjoining buildings, each corps assembling its sick in the rear of its centre."

DISEASES PREVALENT IN CAMPS AND GARRISONS.—PROPORTION OF SICK AND WOUNDED IN ARMIES AND FLEETS.

ATTENTION to the foregoing circumstances in the selection of recruits, the diet, clothing, and exercise of troops, and their accommodation in camp or in quarters, will do much to obviate the occurrence, and to check the progress of disease amongst soldiers; but it has been, perhaps justly, observed, that in all large armies, more men perish by inbred disease than by the sword of the enemy, and that more campaigns have been decided by sickness than by battle; it is not the numbers who fall in action that constitute the greatest loss; they are but a small proportion to those who, in the course of every campaign, sink under neglected wounds, want, fatigue, and disease. As a striking example of this I may refer to the fact mentioned by Sir David Stewart, that the 92d regiment lost more officers and men in four months from the climate of Jamaica, than by the hand of the enemy in an active war of twenty-two years, in the progress of which it was twenty-six times in battle.

In adverting more particularly to the diseases of soldiers, we may remark that, while they admit of all the usual classifications and nosological arrangements into febrile, inflammatory, and so forth, they have, with reference to their peculiar mode of life, been divided into diseases of the Camp and of the Garrison. The former have also been characterized as the diseases of summer and of autumn—this being the season of the year for encampment; and here fever and dysentery have, from the earliest ages, been the scourge of armies; have always been a source of infinite loss to the service, and of unceasing labour to the medical attendants. Of the extent to which these two diseases prevailed in the Peninsular army, some conception may be formed from the following statement, extracted from Sir James M'Grigor's account of the diseases

of that army :—There were admitted during the years 1812-13, and part of 1814, sixty-eight thousand eight hundred and ninety-four cases of fever, of which six thousand seven hundred and three died, equal to 9.7 per cent; and during the same period there were admitted into the regimental hospitals seven thousand five hundred and twenty-six cases of dysentery, of which four thousand seven hundred and seventeen died, or 62.5 per cent.

The diseases incident to soldiers in garrison, or quarters, have also been characterised as the diseases of winter, and of the early part of spring. They consist, in this part of the world, chiefly of inflammatory affections of the chest, rheumatic complaints, venereal diseases, and ophthalmia. The diseases prevalent amongst troops on foreign stations will be more particularly noticed in a subsequent part of this work; but in estimating the proportional sickness amongst troops at different seasons of the year, Sir John Pringle has given a statement from his experience in Germany, in Flanders, and in this country, during the campaigns of 1742 and the subsequent years, which may not be undeserving of attention here. "In the beginning of every campaign," says he, "we are to expect, for the first month at least, that the returns will be considerably higher than if the men had remained in quarters. The earliest encampment began on the 8th of April, and produced such a number of sick, that in a month's time the returns amounted to a twenty-seventh part of the whole. In the year 1745, the campaign was opened on the 25th April; and in 1747, on the 23d of the same month, both in the Low Countries; but in the year 1746, the troops encamped on the 23d of April in the north of Scotland, which, considering the latitude, may be reckoned the earliest campaign during the war. And from all these instances there is reason to believe, that the first proportion mentioned will generally hold when the army takes the field in Flanders in the first or second week of April. At the end of the campaign in Germany, the number in hospital were to the men in health as three to thirteen. In 1747, when the troops left the field, the sick made about one-fifth part of the whole number; but if we consider by itself the detachment sent that year into Zealand, this proportion was just inverted; for the men in health were

to the diseased only as one to four." We learn also from the same authority, that of the troops stationed, during 1747, in South Beveland and the Island of Walcheren, some of the corps were so sickly as not to have more than one hundred men fit for duty, which was less than the seventh part of a complete battalion; "the Royals, in particular, at the end of the campaign, had but four men that never had been ill." An interest is given to these calculations by a repetition of the same disastrous occurrences in the more recent expedition to the same locality in 1809, during which many thousands were lost to the service, and from the effects of which some officers of my acquaintance are still suffering. To compare this with what has recently happened in another quarter of the world, I may notice the statement made by Dr. Kennedy regarding the sickness in the Bombay division of the army of the Indus. From 1st November 1838 to 31st December 1839, the number treated was, Europeans and natives, 11,689, and the deaths 408; which, compared with the strength, sufficiently indicates the hardships endured, and the efficiency of the hospital establishments.

From Colonel Tulloch's statistical statements it is inferred that soldiers in the United Kingdom are under medical treatment once in thirteen months; in the West Indies twice within that period. In this country one case in sixty-seven proves fatal, and in the West Indies one in twenty-four. In Mr. Alcock's "Notes on the Medical History and Statistics of the British Legion in Spain," are some important tables bearing on the following points:—The ultimate loss to the effective strength of an army from wounds, and the scale in which the first loss after an action progressively diminishes; the average mortality from musket wounds; the proportion which the different classes of wounds bear to each other; and this with reference to the wounded of a force attacking and defending batteries, houses, and lines, skirmishes and actions in the open field, and the assault of a fortified town. It is remarkable that the invention of gunpowder, and the introduction of artillery, seem unquestionably to have diminished the waste of human life, more particularly, perhaps, in naval engagements. It is said that when Edward the Third attacked the French fleet at Sluys, the English, after pouring

in a volley of arrows, boarded the enemy's ships and gained a glorious victory, with the loss of 4000 men; of the French more than 30,000 perished, the greater number of them being driven overboard and drowned; whereas the victory of the Nile was obtained at the expense of 218 men killed and 677 wounded; and the glorious and decisive one of Trafalgar at somewhat less than 420 killed and 1112 wounded.

The following statement of the numbers of sick and wounded in the Peninsular army, from 21st December 1811 to the 24th June 1816, is given in Sir J. M'Grigor's paper on the health of that army:—"On reference to the returns of sick and wounded for the above period, it appears that 346,108 cases of disease or wounds were treated in the hospitals; of which were discharged cured 232,553; there were invalided 4586; and 18,518 died of their wounds or of disease —including, however, every wounded man who had been received into hospital, or who had even been seen by a surgeon." Into this statement some accidental error seems to have crept, as the numbers cured, dead, and invalided does not correspond with the total number treated, but it gives us a view of the chances of war upon an extended scale. It refers to a period of considerable duration, embracing very active operations, and gives some idea of the contingencies incident to a European army fighting on a European soil. With reference to the same service, we have a valuable paper on the mortality and sickness of soldiers engaged in war by Mr. Edmonds, compiled from returns in the Adjutant-General's office, and it is there stated that in the Peninsular army, averaging a strength of 64,227, including officers and men, the annual ratio of mortality, from the 25th December 1810 to 25th May 1813, was ten per cent of the officers, and sixteen per cent of the men, and that this army had, during the above period, 22½ per cent constantly sick.

There is an interesting statement of the results of the Russian campaign given by Baron Larrey, in the fourth volume of his "Mémoires de Chirurgie Militaire," where he says, "In rendering account, as far as I am concerned, of the result of the campaign which is just concluded, I have to observe that, of about 22,000 who were wounded in the various battles and skirmishes of the Grand Army, including

the Guard, from the 1st of May 1813 till the 1st of June following (not to speak of the wounded belonging to the enemy's army who were conveyed in our ambulances), 14,084 lodged in the hospitals situated between the Oder and the Rhine were examined by boards of health established in virtue of the order of the 30th June 1813, and the result was, that 6703 officers or soldiers who were cured re-entered their respective regiments to return to active service; 2dly, that 4027 judged to be partially invalided, have been or will be employed in the trains of artillery, in the equipages, or in the service of the ambulances; and lastly, that 3354, judged unfit for any service of the army, and completely invalided, have been sent back to France, with the exception of a few whose wounds were not sufficiently cured; that, of the first mentioned number, 731 have had one or two limbs amputated, and that I performed amputation at the shoulder-joint on twenty-two of these patients.

"I think that, of the 7916 who remain, whose wounds were cured before the general visit, instituted by the order of the 30th June, more than 3000 had already re-entered their regiments cured, and about 2500, whom I presume to be in a state of partial or complete unfitness for duty, arrived at this time in the towns on the Rhine, or crossed into France, according to the reports made to me by the surgeon-majors of the hospitals; 2416 in all have sunk under the severe effects of their wounds. Among these I reckon one-tenth part who had amputation performed on them, and these, added to the above-mentioned 731, of whom one-twentieth part lost two limbs, make a total of 972 amputations. This success, if one considers the scarcity of means, and the frequent variations of the atmosphere which produced tetanus, is due principally to the prompt and methodical assistance which the wounded received on the field of battle, and to the vigilant and assiduous care which our surgeons continued to exercise in the hospitals."

The article Hygiene Militaire, in the "Dictionnaire des Sciences Medicales," contains some observations on the probable number of sick which an army is likely to furnish; and Vaidy, the author of that article, states, that in garrison, in a healthy country, where provisions are abundant, and the barracks well constructed, we may expect about five per cent of sick in the

infantry, and somewhat less in the cavalry and artillery. After a successful campaign, when an army has been victorious, he has known this number much reduced, as for instance, after the campaign of Austerlitz, the French army cantoned in Bavaria, had only a hundred sick in a division of eight thousand men. During a campaign, however, we ought not to calculate upon less than ten sick for every hundred fighting men—a number which is often fearfully increased if the army is very numerous and much concentrated, if it is encamped on wet ground, if it has experienced great privations, and finally, if it is discouraged by defeat or want of confidence in its chiefs. An army of 100,000 men may expect, according to Vaidy's calculation, to have 10,000 sick during a campaign, independent of any rencontre with the enemy, of which number 5000 or 6000 may be medical and the rest surgical cases; but after a battle the proportion will be reversed, and, under the most favourable circumstances, he calculates upon 10,000 or 12,000 wounded, in addition to the above. To this we have sometimes to add the number of wounded left in our hands by a vanquished enemy, to whom our cares are equally due. These calculations become of great importance to medical officers, particularly as they rise upwards in the gradation of ranks, and come eventually to be consulted as to the extent of the necessary establishments for the sick, or to regulate the proportion of medical staff and hospital stores to be allotted to any particular force. It is obvious, however, that only a very distant approach to accuracy can be expected in our endeavours to estimate the loss likely to ensue on any given service. Much depends upon the circumstance of the war being one of defence or aggression, for, in the latter case, the soldiers are considered as the tyrants or oppressors of the people whose country they invade, and these people cut them off individually and collectively whenever they can effect it. Much depends also on the climate, the season of the year, the state of the weather, the provisions and comforts with which an army can be supplied, the fatigue it undergoes, and its success or discomfiture by the enemy.

The foregoing details will enable us to understand what we may expect to meet with in accompanying an army to the field; but we are also encouraged to think that sickness is not

always the necessary consequence of a military life, and that professional skill and judgment may do much to obviate its ravages when it does occur. This may be learned from various interesting accounts both of ancient and of modern wars. In the circumstantial details of the operations of Julius Cæsar's well-disciplined army, we hear of none of his enterprises having been frustrated by the prevalence of disease amongst his troops; and although in many instances exposed to fruitful sources of disease, and sometimes suffering severely from it, the gallant army which lately served in the Peninsula was kept for years together in a state of efficiency which enabled it repeatedly to conquer, and ultimately to triumph over a brave and determined enemy. That much of this efficiency was justly due to the zeal and ability which directed the medical concerns of that army, I hold the following fact to be an abundant proof:—During the ten months from the siege of Burgos to the battle of Vittoria, inclusive, the total number of sick and wounded which passed through the hospitals was ninety-five thousand three hundred and forty-eight. By the unremitting exertions of Sir James M'Grigor and the medical staff under his orders, the army took the field preparatory to the battle with a sick-list under five thousand. For twenty successive days it marched towards the enemy, and in less than one month after it had defeated him, mustered within thirty men as strong as before the action—and this too without reinforcements from England, the ranks having been recruited by convalescents.

A due attention to the accommodation, diet, clothing, and exercise of troops, will always form the best security for their health; and the efficacy of due attention to the occupation of the mind must never be lost sight of. Many illustrations of its powerful influence, whether for good or evil, whether in resisting or accelerating the inroads of disease, may be found both in ancient and in modern times, from the retreat of the ten thousand Greeks under Xenophon down to the present day. It may be observed, that disease goes hand in hand with indolence and inactivity, whether of body or of mind; and that, on the contrary, when the minds of soldiers are agreeably occupied, and their bodies energetically employed, as in the attainment or pursuit of victory, disease is kept in

abeyance. The observations of Mr. Alcock, already referred to, go to confirm the opinion, that "the period of smallest loss to an army is a victorious and vigorously prosecuted campaign, with frequent battles, and much marching." In a company of the Royal Artillery recently stationed at Bermuda, not one death occurred in a period of more than five years—a thing, I believe, unexampled on a foreign station.

But it is in the navy, perhaps, even more than in the army, that the effects of prophylactic measures, both medical and military, have had the most conspicuous influence in diminishing sickness and mortality. A fleet under ordinary circumstances, where the discipline and interior economy of the ships are good, the supply of warm clothing and wholesome provisions sufficient, the means of ventilation and cleanliness perfect—above all, where the officers have it in their power to keep disorder and intemperance in check, may attain a degree of health which can never be expected in an army on active service. A long sea voyage was formerly considered one of the most unhealthy situations to which a man could be exposed, while by the institution and enforcement of prophylactic measures a ship's company may now be conducted round the world, exposed to every vicissitude of temperature, and to all the hardships and dangers of the sea, with a smaller proportional loss of men than would happen in almost any other given situation. Of this we have abundant proof in the following rates of mortality in the Royal Navy, as stated by Sir Gilbert Blane:—In 1779, the deaths were one in eight annually; in 1811, one in 32, and in 1836, one in 72. A higher degree of health cannot well be supposed than that enjoyed in the Warspite during a period of three years on the South American station. The ship's company varied a good deal in number on account of the frequent reception and discharge of supernumeraries, but the average was upwards of 600, the rate of mortality from disease was about two, and including accidents, about four in the thousand.

In a paper read before the Statistical Society of London in February 1841, Colonel Tulloch has given an interesting comparison of the sickness, mortality, and prevailing diseases among seamen and soldiers, founded upon the statistical reports for the two great branches of the public service. After

some preliminary remarks, he observes, with regard to the comparative frequency of fevers, that "this class of diseases is about twice as prevalent and fatal among the military as the naval force—a circumstance which will not excite surprise, when it is kept in view that fevers depend so very materially on locality; and that while the troops are at all times constrained to remain in a spot which may be the very focus of disease, a vessel can choose her position, and either lie at a distance from the shore, or, if that precaution proves unavailing, can put to sea, and speedily place her crew beyond the reach of danger. The remarkable coincidence in the proportion of deaths to attacks in the two services, shows that there can be little difference in the efficacy of the mode of treatment employed; for among the sailors 1 case in 56 proved fatal, and among the soldiers 1 in 57, the result being to within a fraction the same in both cases."

The observations on the comparative frequency of phthisical complaints or diseases of the lungs, apply more particularly to the Mediterranean station. "The attacks by this class of diseases have been nearly twice as numerous among the naval as among the military force employed in the Mediterranean, but the mortality has been only half as great. Many soldiers sent home from Malta, with the apparent symptoms of confirmed phthisis, have arrived in this country in renovated health, and speedily returned to their duty; and so marked has been the improvement in several instances, that within the last year increased facilities have, at the special request of the medical officers, been afforded for sending home invalids of this class. Thus, while the faculty in this country are sending their consumptive patients to Malta, the medical officers in that island are sending soldiers labouring under the same disease to England. And as benefit is supposed to be derived from the change in both cases, it seems much more likely to arise from the influence of the voyage than mere change of residence, especially as the proportion of deaths among those labouring under consumption is remarkably low on shipboard."

On the comparative frequency of diseases of the stomach and bowels, the last class which I shall notice, there is the following very remarkable statement:—"This class of

diseases is not only less prevalent in the naval than in the military force, in the proportion of 155 to 188, but the mortality is little more than a third part as high. This is owing principally to the rarity of dysentery, of which only 742 cases and 18 deaths occurred among the former, while 2308 cases and 108 deaths took place among the latter during the period. This disease is by no means common on shipboard, even in commands where it is the principal source of sickness and mortality among the troops. For instance, among the squadron serving on the West Indian and North American station, only 12 per 1000 were attacked, and 3 in 10,000 died annually from it, while among the military force serving in the West Indies, 163 per 1000 were attacked, and 7 per 1000 died annually. The healthful breezes of the ocean seem to exert a most beneficial influence on this disease, for it has often been remarked, that if a patient can only be embarked at an early stage, his recovery is almost certain."

The gallant Lord Nelson is said, by proper discipline and wholesome regulations, to have kept the crew of a vessel which he commanded in such perfect health as not to have lost a man by death in three years, and this too on the West India station! The name of this distinguished officer, thus honourably connected with the health of his crew, reminds me, that although it belongs to the medical officer to suggest measures for preserving the health of seamen and of soldiers, it belongs to the commanding officer to give them due effect. The means of preserving the health and efficiency of fleets and armies has not yet sufficiently engaged the attention of the authorities, although the superiority of prophylactic over remedial measures has been distinctly pointed out by numerous writers, and must never be lost sight of. Sir Gilbert Blane remarks, that it could be made evident, in an economical and political point of view, independent of moral considerations, that the health and lives of men might be preserved at a much less expense than what is necessary to repair the ravages of disease. And Sir John Pringle has observed, that "although most of the causes of disease are hardly to be avoided in time of actual service, yet as these only dispose men to sickness, and do not necessarily bring it on, it is incumbent on those who have the power to make such pro-

vision as shall enable the soldier to withstand most of the hardships of a military life;" and he adds, with much truth, "that the preservatives from disease are not to depend on *medicines*, nor on any thing which a soldier has it in his power to neglect."

It is unnecessary to adduce farther authority in support of a position almost self-evident, but I cannot resist this opportunity of pointing attention to the following passage, in which our late venerable and lamented professor of the practice of physic in this University has, with that force and eloquence so peculiarly his own, shown us how inadequate the habitual use of medicine is to secure that vigour of constitution upon which the efficiency of a soldier so essentially depends:—"Neque multo profecerunt qui ad normam medicam vivendi rationem semper accommodare tentaverunt; et minus adhuc qui *ope remediorum* prosperam valetudinem firmare et conservare conati sint;—omnis autem tuendæ sanitatis cura, omnisque morborum arcendorum spes et fiducia, hoc solo cardine versantur, nempe, ut a causis morborum remotis, cum ab iis quæ proclivitatem faciunt, tum quoque ab iis quæ in corpore sic proclivi facto morbum quemlibet excitent, quantum fieri possit, præcaveatur, et hæ omni cura eviteutur, illæ corrigantur."

HOSPITALS.

In entering upon the subject of military hospitals, and attempting to trace the successive steps by which we have been led to the formation of establishments considered so indispensable in the armies of modern Europe, it is much to be lamented that we possess little or no detailed information regarding the provision made for the treatment of the sick and wounded in former times. That medicine was occasionally distributed in the Macedonian armies is to be inferred from the historical fact of Alexander having once been exposed to the murmurs of his soldiery, in consequence of its omission. But it does not appear from any ancient writings, either historical or professional, with which I am acquainted, that the treatment of the sick and wounded was, in general, an object of serious attention to the leaders of armies; for although the states of Greece and Rome early saw the propriety and necessity of providing for soldiers who were disabled from further service, and although the justice of this is distinctly admitted, "*Vulneratorum magnam haberi curam æquum est*," yet this was obviously meant to apply to those permanent provisions now given to disabled soldiers in the shape of pensions, rather than to any professional means of treatment in the recent state of wounds, or in the acute stages of disease.

We are informed that Solon deducted something from the pay of soldiers, and employed it for the education of children whose fathers had fallen in battle, that others might be encouraged to bravery; while Pisistratus, acting on the same principle, made an order that those who had lost any of their limbs in war should be maintained at the public expense. The Romans recompensed their deserving and disabled soldiers, by awarding them honours, privileges, and pecuniary pensions. A veteran was authorized to carry a cane, like a centurion, when he entered a camp; and when guilty of a misdemeanour,

he was not liable to be flogged, or to suffer any ignominious punishment. Constantine awarded to veterans waste lands in perpetuity, with an exemption from imposts. Each individual received a pair of oxen, a hundred bushels of grain, and a sum of money to enable him to purchase agricultural implements. As yet, however, we find no notice of anything like our modern establishments for the treatment of the wounded, and of those labouring under acute disease, excepting indeed the Valetudinarium of the Roman camp, which is figured in Grævius's Roman Antiquities, but of the nature and regulations of which we possess, so far as I know, no detailed nor perfect account.

Although thus imperfectly acquainted with the hospital equipment of the Roman army, we have recently been furnished with a most interesting proof of the existence of a medical staff. In the Museum at Newcastle-upon-Tyne is to be seen a monumental stone inscribed to the memory of a young surgeon serving with the Roman army in this country, in the time of the Emperor Severus. For an account of this stone, and a *fac-simile* of the inscription, the profession is indebted to Staff-Surgeon O'Callaghan, formerly of the 4th Dragoon Guards. This subject has recently been investigated by my learned colleague Dr. Simpson, whose professional industry and research nothing escapes. In a pamphlet printed four years ago, under the title—"Was the Roman Army furnished with any Medical Officers?" he has put me in possession of some interesting information which I had in vain sought for in other quarters, and has kindly given me impressions of three monumental stones erected to medical officers of the Roman army, exclusive of the one previously figured by Dr. O'Callaghan. Within these few days Dr. Simpson has pointed out to me, in "Mommsens Inscriptiones," a monumental tablet raised to a lady, probably his wife, by a physician of the ship Cupid, a *trireme*, belonging to the Milesian division of the Roman fleet.

One of the first houses for the reception of indigent sick was that built at Rome by Fabiola, a Roman lady, the friend of St. Jerome, and who consequently lived in the fourth century. It is nevertheless true that these older hospitals were rather established for the poor than for the sick; and hospi-

tals, according to the meaning of the word at present—that is, such as were destined for the sick alone, were not introduced before the eleventh century. It is recorded in the life of St. Lanfranc, who was archbishop of Canterbury in the year 1070, that he caused a hospital to be built there, and fitted up so, that one part of it was appropriated for the reception of sick men, and the other of sick women. It is probable that this prelate formed the institution here mentioned after the model of those which he had previously seen in his own country, Italy; and, after this period, similar establishments for the sick are mentioned in various other parts of the world.

Of the internal economy of the oldest houses for the reception of the sick, I believe that no accurate information is to be found. It is not even known whether physicians and surgeons were appointed to them, nor in what manner they were supplied with medicines. In the hospitals at Jerusalem, the knights and brothers attended the sick themselves, bound up their wounds, and acted as their physicians, in imitation of the Grecian heroes; and Möhsen remarks, that the well-known *baume de commandeur* is one of the oldest compositions belonging to the times of knighthood. Profound or extensive knowledge of medicine could not be expected amongst these warriors, even if we were ignorant of the account given of their skill by Guy de Chauliac, who wrote his book on the healing of wounds in the year 1363. This author mentions different medical sects, and amongst these names the German knights as the fourth sect, who, he says, cured wounds by exorcism, oil, wool, and cabbage leaves.

The first regular establishment for the reception of invalid soldiers which occurs in history is that formed at Constantinople by the Emperor Alexius Comnenus, at the end of the eleventh century—a complete description of which may be found in the history of that prince, by his learned daughter Anna Comnena. The emperor caused a number of buildings which stood around a church to be fitted up as a hospital, into which were received sick and indigent persons of both sexes and of all ages, and, as the female historian expressly states, soldiers dismissed from service were admitted into it, and provided with bed, board, and clothing.

Of the hospitals for invalids at present in existence, the oldest and largest is that established at Paris. The kings of France enjoyed from the earliest times what is called *droit d'oblat*, which consisted in the power of sending to abbeys and monasteries, in order to be maintained, officers and soldiers unfit for further service, and particularly such as had been wounded. It may be readily conceived how unpleasant these guests must have been to the clergy, and how little the ideas, mode of living, and manners of these two classes would accord with each other. The complaints on this subject had become so great under Henry the Fourth, that he at length resolved to cause all invalids to be lodged and maintained together in a palace, called *la Maison Royale de la Charité Chrêtienne.* But as the revenues destined for the support of this establishment were not sufficient, it was abolished under the same sovereign, and the invalids again distributed amongst the abbeys and convents. In the course of time these houses purchased exemption from this burden, by giving an annual pension to their guests, who soon spent their money, and then fell into a state of the most abject poverty. On this account Louis the Thirteenth renewed the experiment of founding an hospital for invalids, which, for want of money, was never completed. At length Louis the Fourteenth, in the year 1670, commenced the present magnificent *Hotel des Invalides.*

In the year 1682, Charles the Second of England commenced the hospital for invalid soldiers at Chelsea; and the larger and more magnificent hospital for seamen at Greenwich, first suggested by Mary, the consort of King William, was begun in 1695, and from time to time enlarged and ornamented.

The first traces of field hospitals, or, as they are sometimes called, flying hospitals, occur perhaps in the East. At any rate, the Emperors Mauricius and Leo the Sixth had along with their armies certain followers termed *deputati* (Δαιποτατοι), who were distributed among the cavalry, and were obliged to carry off those wounded in battle. On this account they had on the left side of the saddle two stirrups, in order that they might more easily take up the wounded behind them; and for every person thus saved they obtained a certain reward. They were obliged also to carry with them a bottle containing water,

for the purpose of reviving those who might have fainted through loss of blood.

In early times, however, it would seem that the spiritual rather than the bodily wants of warriors were the chief objects of attention; for although an order was made by the first council of Ratisbon, in 742, that every commander of an army should have along with him two bishops, with priests and chaplains, and that every colonel should be attended by a confessor, no mention is to be found either of field hospitals or of army surgeons belonging to the first Christian armies, in the writings of the middle ages. We learn indeed from the works of Paracelsus, Thurneyser, and others, that they were present at battles and sieges, but they were not appointed as army surgeons, and served merely as soldiers. The field surgeons, who occur as accompanying armies in the beginning of the fifteenth century, were destined rather for the use of the commanders and principal officers than for the service of the field hospitals. Their number was too small for a whole army; and as they were authorized by their commissions to receive prisoners and booty, and, like the knights, were obliged to bring with them archers, it is highly probable that to fight was a part of their duty also.

Spain, which has in recent times been so often the scene of conflict between hostile armies, would seem also to have been one of the first countries in which the wounded soldier found a home. In the Chronicle of the conquest of Granada, we are told that, in the spring of 1484, the ancient city of Antequara resounded with arms—a chosen force of six thousand horse, and twelve thousand foot having been assembled, many of them the very flower of Spanish chivalry. Every precaution was taken to provide this army with all things needful for its extensive and perilous inroad. Numerous surgeons accompanied it, who were to attend upon all the sick and wounded, without charge, being paid for their services by the Queen. Isabella also, in her considerate humanity, provided six spacious tents, furnished with beds, and all things requisite for the wounded and infirm. These continued to be used in all great expeditions throughout the war, and were called the Queen's hospital. The worthy Frey Antonia Agapida, vaunts this

benignant provision of the Queen as the first introduction of a regular camp hospital.

Harte, in his Life of Gustavus Adolphus, seems to believe that this prince first appointed four surgeons to each regiment, which he reduced from the number of 2000 or 3000, first to 1200, and afterwards to 1008; and Harte is of opinion that the imperial troops at that time had no surgeons, because Tilly himself, after the battle of Leipsic, was obliged to have his wounds dressed by a surgeon established at Halle. However this may be, it is certain that the field hospital establishments of the imperial army, till the beginning of the eighteenth century, were on a very bad footing. Even in the year 1718, they had no field surgeons; but at this period the company surgeons were dismissed, and a regimental surgeon, with six assistants, was appointed to each regiment; and besides the field medicine chest, surgical instruments were provided at the emperor's expense.

The establishment of field hospitals in Germany would appear to have been prior to the middle of the sixteenth century; for Fronsperger, who wrote about that period, does not speak of field surgeons, army surgeons, and their servants, as if they had been then newly introduced, but in such a manner as shows that the need of them had been generally acknowledged and supplied before his time. According to his statement, it was necessary that there should be, along with the commander-in-chief, a field surgeon-in-chief, who had the inspection of the field-surgeons, the barbers, and their servants, whose duty was to drag the wounded from the heaps of slain, and to convey them to their masters. He was obliged to keep by him instruments and medicines, and at each muster to examine the instruments and apparatus of the field-surgeons. He decided also in disputed cases, how much soldiers, whose wounds had been cured, ought to pay to the field-surgeon; and during marches, he was bound to remain with the commander-in-chief. Fronsperger says also, that there ought to be with the artillery a general field-surgeon, and with each company a particular field-surgeon, not, however, a paltry beard-scraper (*bartscherer*), but a regularly instructed, experienced, and well-practised man. The extraordinary alliance here alluded to, between shaving

and surgery, which has always been so unpalatable to the profession, would appear to have been fostered, or rather, insisted on, by some governments even up to the beginning of the present century. So late as 1801 certain Englishmen, who had entered the Swedish navy as assistant-surgeons, were dismissed the service for refusing to shave the crews of their respective ships.

Field hospitals were first established in France under the illustrious Henri Quatre at the siege of Amiens in 1597; and the benevolence of the institution was so gratefully acknowledged by the soldiers, that they distinguished the campaign in which they were established by the name of the *velvet campaign*. Humanity to the wounded seems, even long prior to this period, to have been a trait conspicuous in the character of the French monarchs—St. Louis himself, the ninth king of that name, having personally assisted in the cure of the soldiers, whose wounds were the consequences of the wars undertaken for the purpose of expelling the infidels from the Holy Land, or of his contests with our Henry the Third.

The appointment of regimental surgeons in the English army was, it is believed, coeval with their corps; but at what precise period it became customary for them to provide houses for the reception of the sick, and to treat them collectively in such receptacles, I have not been able to ascertain, although these institutions were certainly prior to the time of Monro and Brocklesby, who wrote soon after the middle of the last century. Dr. Donald Monro, who seems to have examined the ancient writers with great care, for information on the subject of military hospitals, and for the means of accommodating the sick and those wounded in battle, observes that no ancient author that he had met with makes mention of the particular manner in which their military hospitals were conducted. We know, indeed, from the writings of Livy, Tacitus, and others, that it was the custom in ancient times to intrust the wounded, after great battles, to the hospitality of the neighbouring gentry, into whose houses they were received —a practice certainly very inconsistent with efficient medical treatment; for, to say nothing of the impossibility of visiting sick sufficiently often when thus dispersed, the hospitality of their entertainers would no doubt often be exercised to a

very injurious extent. Dr. Monro, however, says nothing of the first establishment of military hospitals, either fixed or movable, general or regimental, in the British service, but speaks of them both as well known in his time. "In times of war," says he, "when the regiment is ordered on actual service, the surgeon and his mate always go with it, and their duty is to take care of the sick and hurt in their own regimental hospital; and in spring or summer, when the regiment takes the field, they encamp with it, and have generally some tents pitched in the rear of the regiment, for the reception of such as may fall sick, till an opportunity offers, of sending those ill of fevers, fluxes, or other dangerous disorders, or have received bad wounds, to the nearest general hospital."

Of the wretched accommodation provided for the sick soldier, even so late as the time of Dr. Brocklesby, we have a lamentable picture in his writings, which he concludes by observing, that "to the important subject of military hospitals, neither Montecuculli, Folard, Fequieres, the great Conde, Marshal Saxe, General Bland, nor any other writer with whom he was acquainted, had paid much attention; for officers in this respect conceived that they had little more to do than to consign the sick to the best of those accommodations which chance, necessity, or a base parsimony, had provided for them." This reproach is completely taken away by the arrangements of the present time. And I now proceed to advert to some of those points most deserving attention in carrying these arrangements into effect.

The remarks already made on the site, construction, and ventilation of barracks, for the most part apply *a fortiori* to military hospitals, and hence these points need not detain us long. In the barracks of this country, both those of a temporary and permanent nature, hospitals sufficiently commodious, airy, and well ventilated are generally provided, and these are such as to afford the surgeon every advantage in the treatment of his sick; but when employed in a foreign country, it becomes a most essential part of the surgeon's duty to select and appropriate, under the authority of his commanding officer, such houses as are best adapted for the reception of the sick and wounded. In large cities and towns where the principal establishments of an army are formed, hospitals belonging to

the country are to be found; but even if justice and humanity entitled us to turn out the wretched inhabitants of such abodes, it is not always that they could with safety be appropriated to our purposes, from the nature of the diseases prevalent in them. In cases where the climate and season are favourable, and where facilities exist for their construction, temporary wooden hospitals afford perhaps the best of all accommodations for the wounded.

Where houses are to be selected for hospital establishments, the larger public buildings of a city are to be preferred. In Roman Catholic countries, monasteries, colleges, &c., are commonly to be found well adapted to this purpose; and, in many instances, palaces, spacious houses, barracks, granaries, &c. may be employed for the reception of sick. Churches, which have been sometimes used for this purpose, are less eligible, particularly when they are paved with flags, or when the practice of the country permits the burial of the dead within their precincts. When we have an opportunity of making a choice we will naturally give the preference to buildings constructed on elevated and dry ground, with a favourable aspect, and an abundant supply of wholesome water. When in a low country, care should be taken as far as possible to prevent the hospitals from being exposed to marshy exhalations; and in such situations the lower floor of a building should not be occupied by the sick if it can be avoided. The superior degree of health frequently existing in an upper floor of the same building, while the men on the ground-floor are suffering from disease, has often been remarked. Several instances of this are noticed by Sir John Pringle, particularly amongst the troops quartered at Ghent, in 1742, where it was observed, that such as lay in the upper storeys enjoyed much better health than those who were below on the ground-floors, which were all very damp.

In a very interesting and valuable paper, on the "Nature and History of the Marsh Poison," by Dr. William Fergusson, published in the Transactions of the Royal Society of Edinburgh, he observes, that "no experiments hitherto made have enabled us to pronounce whether it is specifically heavier or lighter than common air; but it evidently possesses an uncommon and singular attraction for the earth's surface; for in all

malarious seasons and countries the inhabitants of ground-floors are uniformly affected in a greater proportion than those of the upper storeys. According to official returns during the last sickly season at Barbadoes, the proportion of those taken ill with fever, in the lower apartments of the barracks, exceeded that of the upper by one-third, throughout the whole course of the epidemic."

Of this exemption from disease in the upper floor of a barrack, while it raged below, a very remarkable instance fell within my own observation in the 69th regiment, at that time quartered in the fortress of Seringapatam, and occupying a building which had formerly been one of Tippoo's palaces. I recollect also in the large hospital at Sourabaya in the island of Java, one of the best hospitals I have ever seen, we used to remark the more rapid convalescence of patients upon the upper floor. Indeed the lower storey of this building was very judiciously appropriated to the necessary offices of the establishment, and but a small portion of it was occupied by the sick.

When a medical officer is consulted as to the plan and construction of a hospital, the leading points he should bear in mind are, to have the hospital so situated with regard to the barrack as to prevent the ready access of idle visitors, or indeed any communication with the exterior which is not authorised by the medical officer. The wards should be lofty in the roof, capable of thorough ventilation, and not too large; perhaps those containing from twelve to sixteen patients are the most advantageous. Many of the barrack hospitals erected in this country during the late war, of which plans are to be seen in the museum, afforded examples of all that is desirable in buildings of this kind. Of the temporary war-hospitals, constructed of wood, a good example is to be seen at Greenlaw near Edinburgh, now converted into a military prison; and numerous wooden sheds, erected several years ago, during the prevalence of fever in Ireland, are still to be seen at Dublin—examples of what may be done for the sick in cases of emergency.

In calculating the accommodation of a hospital, Dr. Hennen estimates that there should be at least six feet by six for each bed, or thirty-six feet square, whatever may be the

height of the ward, and the room should be apportioned to patients agreeably to an estimate of its cubic contents; thus, a room sixteen feet long, ten broad, and ten high, will contain 1600 cubic feet of air, and is calculated to accommodate two patients, allowing 800 cubic feet for each. This may be considered sufficient in cases of emergency, or in convalescent wards; but when there is a large proportion of bed-ridden patients the space should not be less than 1000 cubic feet for each individual. And it should be a general rule, that when there are any fractional parts above the specific allowance, such fractional parts should be allowed as an equivalent for the portion of air displaced by the bedsteads, tables, forms, &c. Tenon, in his interesting work on the Parisian Hospitals, states, as the proper allowance for each convalescent patient, six and a half cubic toises of air, and seven cubic toises for each sick patient, which, says he, is the proportion in those hospitals where I have found the mortality moderate, "où j'ai trouvé la mortalité modérée." These estimates are, however, considerably short of the space allotted to patients in some of our modern hospital buildings.

In a small work recently published,—"Observations on the Site and Construction of Hospitals," I have adverted to three different forms or scales of hospitals; first, Those in the shape of a common quadrangular building like a dwelling-house, with two or more floors, of which the best example that I am acquainted with is the new County Hospital at York; secondly, A very common form of hospital, consisting of a body and two wings, in the form of the letter H, of which there were numerous examples in the temporary barrack hospitals during the last war; and thirdly, The design of the great naval hospital at Plymouth, consisting of numerous separate buildings round a large quadrangular space; and in that work I have given the average dimensions of 134 wards, in forty of the principal hospitals in this country, including the naval and military hospitals at Haslar, at Plymouth, and at Chatham, the Metropolitan hospitals of London, Dublin, and Edinburgh, and a number of the best provincial hospitals in England. From this it appears that the average length of wards in these hospitals is, in round numbers, forty-seven feet, the average breadth somewhat more than twenty-one

feet, and the average height twelve feet. The Government general hospitals, naval and military, give an average of 984 cubic feet of space for each patient; the metropolitan hospitals 947 cubic feet; and the provincial hospitals 944 cubic feet. In a recent volume of the Edinburgh Medical and Surgical Journal, we have a paper by the late Dr. Kinnis, in which an estimate is given of the space allotted to patients in several of the hospitals occupied by the Queen's troops in the Bombay presidency, and this upon the average is upwards of 1100 feet.

The wards ought as much as possible to approach to a rectangular form, so that the whole of the patients may be exposed at once to an officer's eye the moment he enters the ward. All angular projections, recesses, cupboards, &c., ought to be excluded. Every additional crevice or corner is generally converted into an additional receptacle for filth; and every contrivance of the kind to which I allude is calculated to obstruct the cleaning and ventilation of the wards. Where the hospital consists of two or more floors, the surgery, storerooms, kitchen, and, in short, all the offices necessarily appertaining to a hospital, should be situated on the ground-floor, in order that additional space may be left for the accommodation of patients above. The subject of ventilation it is unnecessary to resume at any length, having already expressed myself fully on this point, in regard to barracks, and suggested a plan which, with due modification, is equally applicable to hospitals. In many instances, the supply of fresh air is advantageously provided for by constructing a series of channels, or air tubes, under the flooring of the wards, which communicate directly with the external atmosphere, and deliver the air into the wards through grated apertures in the floors.

This plan of ventilation has been introduced into the clinical wards of the Royal Infirmary here, and also into the wards of the building formerly occupied as the High School, and now appropriated to the accommodation of the surgical department of the Infirmary; to these last mentioned wards I may refer as affording an excellent example of every thing that is desirable as to shape, size, height of roof, flooring, &c. The leading principle upon which all our plans for ventilation

should be founded, is the simple fact, that air heated by respiration naturally rises to the tops of the wards, while the cooler and heavier air occupies the lower parts; hence judicious openings at the top and bottom of a ward will always provide for the exit of the upper stratum of air, with an influx from below to occupy its place.

In the work just referred to, on the site and construction of hospitals, I have gone more fully into this subject, and have concluded by observing that a prevalent error in the present day is a disposition to lean too much upon artificial modes of ventilation, while the natural course of the air in buildings numerously inhabited is sometimes overlooked, neglected, or counteracted. All our adventitious plans for ventilation should be *supplemental* or *auxiliary* to the natural course of the air, and should be rendered, as far as possible, independent of any apparatus which is liable to get out of order, or upon any thing which patients or servants have it in their power to neglect. In conclusion, I would only remark, that while ill ventilated hospitals have, on the one hand, been represented as the ruin of an army, they have, on the other hand, when duly regulated in this respect, been looked upon as one of its greatest blessings. Sir John Pringle speaks of hospitals, although intended for its preservation, as one of the chief causes of sickness and death in an army, "on account of the bad air, and other inconveniences attending them." While Professor Brugmans of Leyden, who was eighteen years at the head of the medical department of the army in Holland, states, as a proof of the efficacy of ventilation, that in 1799 they received into the military hospital at Leyden, the situation of which was not good, four thousand wounded men, but did not perceive amongst them the smallest trace of hospital gangrene, which he attributes to the vigilant attention of Stark, the surgeon-major, in procuring "a constant renewal of the air."

In order to render military hospitals more fully adequate to the purposes for which they are intended, it would be an important addition if they were all furnished with a receiving-room, or other commodious apartment, supplied with tubs, and with ample command of water, both cold and warm, in order to afford the means of making every patient thoroughly clean

upon his admission; hospitals should also be provided with a foul linen store, and steeping tubs adjoining the wash-house. The dead-houses, store-rooms, necessaries, &c., should not only be better ventilated, but also much better lighted than they sometimes are. The surgeries, too, are often deficient in point of shelving, &c., for the commodious arrangement and preservation of the medicines. Many of the preceding remarks apply chiefly to houses expressly built, or hereafter to be built for hospitals. In appropriating other buildings to this purpose many of the accommodations alluded to must necessarily be dispensed with; but houses eligibly situated, substantially built, capable of being thoroughly cleaned and ventilated, are what we ought to select for the reception of our sick, wherever they are to be found.

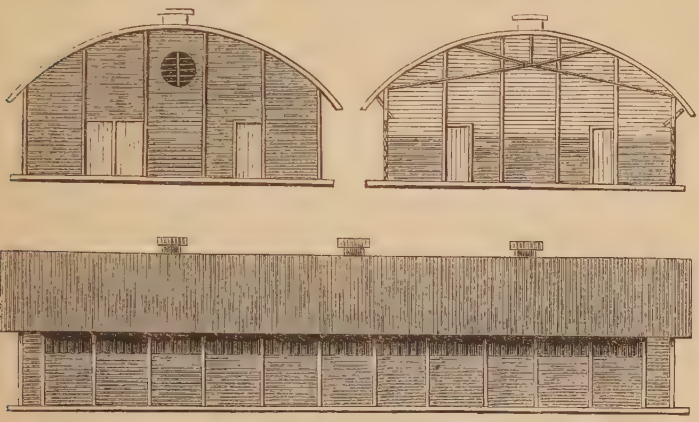
In the "Engineers' Papers," formerly referred to, will be found some useful hints for the construction of hospitals in tropical climates, and I have recently been furnished by Dr. Wise of the East India Company's service, with a sketch and description of the hospital at Chinsurah in Bengal. The most essential points in the construction of such a hospital, particularly in a low or damp locality, are, that the foundation should be sunk three or four feet below the surface. This excavation to be filled up with dry sand and charcoal, while the floor is raised two or more feet above the level of the contiguous ground. On the outside of the building, the ground should be made to slope outwards from the exterior wall for a space of twelve or fifteen feet, and terminate in a drain, surrounding the hospital. The verandahs common to most of the Indian hospitals should be glazed; and if shut in the middle of the day, during periods of extreme heat, they will form reservoirs of comparatively cool air from which the wards may be supplied. When the atmosphere is peculiarly dry, as in the upper provinces of Bengal, or where the hospital is exposed to parching land winds, as was the case with us at Masulipatam, the air should be admitted through moistened tatties of cus-cus grass, and when there is no breeze or movement in the air sufficient to carry on this process, an artificial current may be produced by fanners, or what is sometimes termed a thermantidote. The heated or vitiated air may be carried off by Graham's ventilators, semicircular pots placed over round

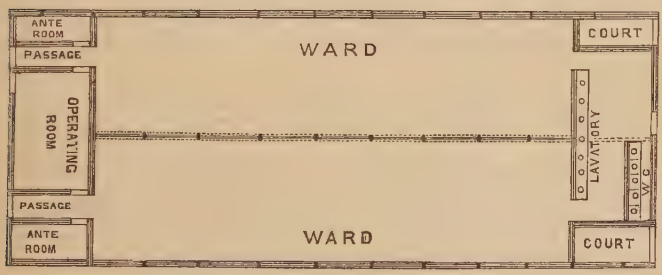
holes in the roof, and which it appears are greatly approved of in Bengal.

In the year 1849, my learned colleague in this university, Professor Piazzi Smyth, the Astronomer-Royal for Scotland, submitted to the Royal Society of Edinburgh an account of some experiments made by him in the preceding years, on the cooling of air; and in the Practical Mechanic's Journal for October 1st and December 2d, 1850, this gentleman has published some interesting observations "On a Method of Cooling the Air of Rooms in Tropical Climates," founded on the "well known property of air to rise in temperature on compression, and to fall on expansion." If the apparatus devised by Mr. Smyth for carrying out his views shall be found to operate successfully on a large scale, it will be a valuable boon to the soldier in India, whether in the barrack-room or in the hospital; but as it has not yet been brought into practical operation, I forbear from enlarging upon it.

Amongst the many views which were suggested to individuals last year by an inspection of the Crystal Palace, I was, from the moment I entered it, struck with the adaptation of similar structures to hospital purposes, and more especially to military hospitals. This idea is by no means new. I recollect, when a very young surgeon in the army, to have heard the subject of metal hospitals discussed at the mess table, as adapted to the purposes of the troops. Copper was, I think, the material spoken of; but the proposal was treated as chimerical. In the Monthly Journal of Medicine published here, for November 1848, small-sized iron hospitals have been strongly advocated by my colleague Dr. Simpson, with a view to the prevention of those fearful epidemics which sometimes rage in his department amongst puerperal women, and I understand that an auspicious beginning has been given to the introduction of iron hospitals for the troops. Dr. Linton, now the Deputy-Inspector of Hospitals to the 1st division of the army before Sebastopol, who was stationed here some two years ago, and had then recently returned from the West Indies, tells me that an iron hospital has for some time been in use at St. Vincents, and that a very handsome hospital of this kind, of a highly approved construction, has just been completed at Grenada.

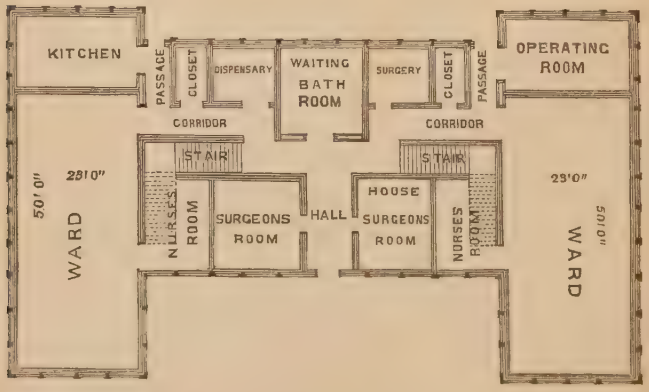
This appears to me to set the whole question of the utility of such hospitals at rest; for I confess that the only doubt in my mind was their adaptation to warm climates. The very opposite objection, of their being too cold, has been raised against iron hospitals as adapted to this country. These objections will, I believe, be found to neutralize each other. Mr. Young tells me that by making the panelling double—two plates instead of one—the cold may be





perfectly obviated; and I conceive that in a country like ours, abounding in fuel, it is much easier to guard the inmates of such buildings against the cold of a rigorous winter, than against the heat of a tropical sun. The woodcut gives a sketch of an iron hospital designed upon the plan of the wooden hospitals now erecting at Aldershot, and, indeed, copied from them. What may be the precise object in view in having the

whole light let in from above, immediately under the eaves of the building, I am not aware of; but it appears to me a very serious error. Nothing can be more cordial to the inmate of a hospital, or more conducive to his cure, than a cheerful look-out; whereas, in a building so lighted, a patient must have the impression of being, as it were, immured in a dungeon. Supposing a patient confined to bed for a fortnight, perhaps with an attack of pneumonia or bronchitis, the moment he is able to crawl he will naturally fly to the door, to get a glimpse of the busy world around him, and lingering there, it may be with an east wind blowing in his teeth, will scarcely



escape a relapse. Here again we have sketches of the elevation and ground plan of an iron hospital upon a larger scale.

which may be made to give accommodation to from 100 to 200 men, and which Mr. Young estimates may be erected with double panelling at an expense of somewhere about from £25 to £30 a man, allowing to each 1000 cubic feet of space. This hospital is constructed with a verandah all round, which in tropical climates is often used by the patients to walk in during the day, or to sleep in at night; and, in all climates, may be inclosed, as represented in the woodcut, and thus made, in cases of emergency, nearly to double the accommodation of the hospital. The facility of ventilation in an iron hospital, where the panelling may be made wholly or partly movable—the promotion of cleanliness, by substances so little likely to retain filthy or infectious matter as iron and glass—and, above all, the rapidity with which such hospitals may be constructed, or moved from one site to another, seem to me to constitute the very essence of everything that is most desirable in a military hospital.

In proceeding to consider the interior economy of hospitals, which embraces the financial, purveying, and culinary arrangements, I shall chiefly advert to these matters as they are conducted in regimental hospitals—these being considered by all experienced surgeons as the most desirable receptacles for the sick soldier, and being the establishments in which a large majority of the British troops fall to be treated when sick. In entering upon this subject, it is necessary to understand that regimental medical officers are, in every respect, except in points purely professional, under the orders of the commanding officer of the regiment, on whom it is incumbent to take care that every attention is paid to the health of the men intrusted to his command—that the sick are properly attended, kindly treated, and that they have every allowance to which they are entitled; but surgeons are always to perform their professional duties under the instructions and control of the Director-General of the Army Medical Department. The general expenditure of the hospital is under the immediate direction of the surgeon, who is responsible for the due appropriation of the fund allotted for its support, as well as for the general conduct of the hospital, and of the servants attached thereto.

Under existing regulations, the sum of tenpence a day is stopped from the soldier's pay towards his maintenance when sick in hospital; and abundant experience has proved that the aggregate sum arising from these stoppages is, under ordinary circumstances, and under judicious management, fully adequate to the necessary expenses of the hospital. The "Fifth Report of the Commissioners of Military Inquiry, printed by order of the House of Commons in 1808," contains much interesting information as to the financial concerns of army hospitals; and an opinion as to the adequacy of the established rate of hospital stoppages to meet the necessary expenses is there expressed in the following strong terms by a very experienced medical officer, Dr. Borland:—"The new system has been introduced in the West Indies by Inspector Kerr; in Sicily by Deputy-Inspector Somerville; at the Cape of Good Hope by Deputy-Inspector Baillie, &c., where the savings have been greater than at home; and there can be no doubt, that if one authority controlled, and one medical regulation pervaded the whole army, the hospital expenditure, medicines included, might be defrayed from the hospital stoppages."

The rate of diet being in every case appropriated to the nature of the disease under which the soldier labours, it no doubt often happens, that what he actually receives, in the shape of aliment, is not equivalent to the amount of his stoppages; but of this he can have no reason to complain, considering that, if reduced either by the nature or duration of his disease to a state requiring additional nutriment and wine, he is equally furnished with them, however much their value may exceed the sum stopped from his pay. On the Indian station, at the time I served in that country, the hospital stoppages were, and I believe still are, only about one-half of what is exacted on other stations. Why her Majesty's orders on this head have not been enforced in India, as well as in every other quarter of the world, I am unable to say; but if the diminished rate of stoppage has been established as an act of benevolence to the sick soldier, the object has been completely defeated—a soldier being able to accumulate money in hospital is an evil fraught with the most injurious consequences to himself and to the service, by holding out an inducement to

him to remain in hospital, and by frequently leading him into excesses on leaving it.

This inferior rate of hospital stoppage, in so far as it is calculated to foster the dissipation too prevalent amongst the soldiery, is adverted to by Mr. Marshall, in a valuable paper "On the Abuse of Spirituous Liquors by the European Troops in India," published in the Edinburgh Medical Journal; and it has been subsequently noticed, both in this and in a financial point of view, by Mr. Scott, of the Madras Medical Establishment, in some remarks on Mr. Marshall's paper, which he printed and circulated amongst his friends in 1834. In this paper, after entering into various illustrations of his views, Mr. Scott concludes that, setting aside any minute calculation of exchanges, "if the Company's rate should be raised to the King's rate, viz., tenpence per diem, there would at once accrue a saving of fivepence on each day's hospital ration; which rations have been estimated at one million and ninety-five thousand in the year, the result would be a saving of £22,802 per annum, on the most moderate calculation—an object certainly of no mean consideration in a financial view, and of still greater importance, as promising at the same time to benefit the soldier himself in respect to his health, and the public service in respect to his efficiency.

In the book of instructions to regimental surgeons, a diet table is given adapted to the products of this country, to the different descriptions and stages of disease, and to the periods of convalescence. This scheme must be rigidly adhered to wherever circumstances admit; and when upon foreign service it becomes necessary to deviate from it, a new scheme adapted to the nature and products of the country should be established by authority of a board, consisting of the senior and most experienced officers of the medical staff. When tables of diet are thus judiciously adapted to situation and circumstances, few occasions will occur where it becomes necessary or proper to make any deviation, or to burden the diet-roll with expensive extra allowances in the shape of food or wine. Such extra allowances tend to create discontent amongst the men, who never can see the necessity of distinctions, nor appreciate the motives which actuate a medical

officer in directing them for one more than another. They are really very seldom necessary amongst a class of men accustomed to the plainest food, all within a given range of age, all situated so much alike, and in many cases labouring under the same class of diseases. The most essential part of a sick man's diet, when anything in the shape of animal food is admissible, is his broth; and this ought to be prepared with the utmost care and attention. When few men are borne on the tables on half-diet, we cannot expect to have it of sufficient strength, unless it be expressly prepared for such patients as cannot consume solid animal food, by adding to the soup-kettle bones, bullocks' heads, shins, or such other parts as will improve the soup at an economical rate.

In seaport towns, where fish are abundant, they may with great propriety be employed as part of the scheme of hospital diet, giving them alternately with meat; and when fruit and vegetables are abundant, they may in some cases be given liberally; pies, however, either of meat or fruit, are for the most part highly improper, and ought not to appear in our hospital diet-rolls. When extra meat is required, it should be plainly dressed in the form of steaks or chops, and fruit should be always well stewed and seasoned. The articles for hospital diet might also be somewhat varied according to the seasons of the year. In the summer months, less animal food is requisite; and the proportion of fresh vegetables might be increased, while rice and barley must be substituted for part of these during the winter. Although no one would willingly contemplate, nor wish to be reduced to the extremity of suffering pictured in Baron Larrey's account of the distresses of the wounded French after the battle of Eslingen, yet we should be aware of what has been done, and what may again be done for the wounded, even in the worst of times. The hospitals on the isle of Lobau underwent great privations in consequence of the difficult communication with the mainland by means of a few boats, and the uncertain supply of provisions and the necessaries of life. Larrey was obliged to prepare soup and bouilli for his patients from horse flesh, seasoning it with gunpowder for want of salt.

Upon home service the meat, bread, and other articles of diet required for the sick, are provided by the several tradesmen or contractors under the purveyor of the district. On foreign service the bread, meat, and more bulky articles of provision are also supplied by the purveyor or commissary; and it is the especial duty of the surgeon to see that these articles are of the best quality to be procured, or to make an immediate report to his commanding officer on the subject, should he find them otherwise. With reference to this point, the following sentiments of Dr. Millingen, applicable to the inferior officers and servants employed in the purveying department of large general hospitals, are particularly deserving of attention:—"Whenever," says he, "a medical officer suspects that irregularities exist, he should diligently and silently watch every motion, until fully able to bring the offence to light, and the offender to punishment. Medical officers must recollect that their professional character is deeply involved in the prosperity or failure of their efforts, which will be rendered nugatory if the interests of the sick are allowed to be sacrificed by the peculation of their servants. Fraudulent conduct on the part of the administrators of hospital economy is not a case of ordinary delinquency; for any act which, directly or indirectly, tends to weaken or cripple our armies, constitutes a national crime; and it is to be regretted that our military code does not provide for the exemplary punishment of such offences."

The impropriety of having the purveying department of hospitals in the hands of the medical superintendent, was pointed out by Dr. Donald Monro in the strongest possible terms many years ago. His observations upon this subject have long been familiar to me, and are fully confirmed by my own experience in India, where, until a recent period, the surgeons held a contract for victualling and clothing their sick. The evils arising from this combination of the purveyor and the surgeon were then daily before my eyes; and the following extracts are from an unpublished memoir upon military hospitals, written many years ago:—Independently of all temptations to abuse, which it is to be hoped most of us could resist, this plan is in some cases absolutely incompa-

tible with the proper dieting of the sick. It may be very possible for a surgeon, while lying quietly in garrison or cantonment, to furnish provisions for his sick without much additional trouble; but whenever his regiment comes to be employed in active operations against an enemy, all his talents and exertions are then required in his proper capacity, and he has his hands abundantly full, without having the complicated concerns of a victualling department to attend to. It by no means follows, that because a man is a good surgeon, he should be a good commissary also; and it is obvious, that whatever tends to withdraw his attention from the study and practice of his professional duties, must ultimately prove injurious to the service.

These observations were written shortly after the capture of Java, where the disadvantages of the practice to which they refer were abundantly conspicuous, as was evident from the orders of the commander-in-chief; and where a case occurred, tending, perhaps more than any other circumstance, to confirm my opinion of the evils accruing from having the purveying department in the hands of the surgeon. That case I have noticed in the following words:—The present allowances are well known to be in general adequate to all the purposes required of them, but instances are not wanting where the surgeon has been for months together considerably out of pocket by a large demand for wine; indeed I know a case at this moment quite in point—it is that of an assistant-surgeon, left by the death of his surgeon in charge of a sickly regiment requiring a large supply of wine. He has no prospect of retaining the charge of the regiment for any length of time, and of course no prospect of reimbursing himself at a favourable opportunity. What is to be done? This young man must either procure wine from his private funds, and involve himself in debt, or he must withhold it and let his patients suffer; the alternative is dreadful. In such a case it is extremely hard to say how far a man's philanthropy and public spirit should carry him, and where an attention to his private interest ought to make him stop short. Certainly nothing so important as the supplies for the sick ought to rest on the precarious footing of an individual's liberality.

The foregoing remarks may now perhaps be considered superfluous, as the practice to which they refer has recently been abolished in India as well as everywhere else. But I am pleased to have the opportunity of expressing my opinion of a practice which I have always reprobated, and am anxious that the members of my profession should never again be exposed to those ignorant, illiberal, and offensive insinuations to which they will always be subjected, when acting under a system where a man's duty and his interest appear to be at variance, and where there is even the most distant ground for believing that the surgeon, by stinting his patient, can enrich himself. A vestige of this obnoxious combination of the purveyor and the surgeon has unfortunately remained up to the present time, in so far that the medical department has been held, to some extent, responsible for what are termed "medical comforts," including wine; and those who have paid attention to the proceedings of the Committee on the Army before Sebastopol, will see that this has led to most offensive and injurious reflections on the Medical Department, such as there was no foundation for in the case to which I allude, and such as no room should be left for in future.

It has already been observed that two different classes of hospitals are established in the British army, and it may be right to give a summary exposition of the comparative advantages of general and regimental hospitals, for the information of those who have not had an opportunity of witnessing the contrast. General hospitals have sometimes been characterised as *general* but *necessary* evils. To them the observation already quoted from Sir John Pringle respecting the vitiated air of hospitals, as well as the following remarks of Dr. Jackson, are more particularly applicable:—"Height of roof is a property of great importance in a house appropriated to the reception of the sick of armies; for the air being contaminated by the breathings of a crowd of people in confined space, disease is generated, and mortality is multiplied to an extraordinary extent. It was often proved in the history of the late war that more human life was destroyed by accumulating sick men in low and ill-ventilated apartments than by leaving them exposed in severe and inclement weather at the

side of a hedge or common dyke. It is fit that the military officer mark this fact, and bear it in mind."

It is indeed conformable to all medical experience, that when large bodies of sick are brought together, disease is frequently aggravated, and contagion sometimes generated; but, independent of the evils arising from this concentration of disease, the slovenly, irregular, and unsoldier-like habits, so readily contracted by soldiers while patients in general hospitals, has often been a source of regret to commanding officers, and of serious injury to the service; while the abuses and peculations existing in these hospitals have been at all times an endless source of complaint. General hospitals are, however, indispensable upon service, and much may be done to obviate the evils attending them, by a due classification of patients.

Independently of the usual arrangement of patients according to the diseases under which they labour, wherever space will admit, it may be useful to subdivide the sick according to the divisions, brigades, or regiments to which they belong; so that medical officers of divisions, brigades, and regiments, when serving in these general hospitals, may have their respective charges concentrated as much as possible; while by the mere juxtaposition of men belonging to the same regiment, the steady soldier or non-commissioned officer who feels for the character of his corps, may have a vigilant and controlling eye over those who may be disposed to irregularities, idleness, or malingering. General hospitals, when well regulated, afford perhaps advantages and superior comfort to the sick soldier worn down by protracted disease, as in them he has the advice and attendance of the ablest and most experienced medical officers: as schools of instruction, too, they are capable of being made useful to young men joining the army—advantages to be set off against the evils and abuses with which these establishments have been charged.

Let it not, however, be supposed that I mean to dissent from the opinion entertained, I believe, by every experienced medical officer, of the superiority of regimental hospitals, which afford the means of effectually treating the sick of armies, without that accumulation of disease, irregularity of

conduct, and complication of accounts, which have sometimes proved so detrimental to the service. Of the advantages derived from regimental hospitals in the last war, some estimate may be formed from the following opinion expressed by Sir James M'Grigor, with reference to the health of the Peninsular army:—"However short a time a battalion or a corps rested in one place, a regimental hospital was established; indeed, as they carried with them medicines, bedding, stores, and all the materials of a hospital, a regiment might be said to have its hospital constantly established even on the march. It was frequently established in the face of an enemy, and nearly within the reach of his guns.

"When a regiment halted, after getting the men under cover in some building, and constructing chimneys, the first object was to make bedsteads, getting at the same time mattresses of straw, rushes, &c. It was really surprising to see with what rapidity this was done. So much were the regiments in the habit of it, that latterly I found the hospitals complete in everything, and the men most comfortably lodged, in a few days after the regiment had halted. In short, by making every corps constantly keep up an establishment for itself, we could prevent the general hospitals from being crowded. Much severe and acute disease was treated in its early and only curable stage, and no slight wounds or ailments were ever sent off from the regiments; by which means the effective force of the army was kept up, or perhaps increased by several thousand men, and this was effected by the joint exertions of the medical officers who served in the Peninsula—the result of medical science, and their experience of soldiers, their habits, and their aptitude to particular diseases."

"Regimental hospitals," says Dr. Millingen, "hold out advantages which will in vain be sought for in general ones. Conducted under the eye of the commanding officers of corps, they form part of the regimental economy. The surgeon can acquaint himself with every individual's character, habits, and description—circumstances which most materially tend to assist him in the execution of his duties. The men, indeed, assembled in these establishments are bound by ties of regimental

discipline and economy, which constitute the superiority of battalion hospitals. Here misconduct is more thoroughly repressed, and malingering more easily detected. An *esprit de corps* is kept up, which promiscuous intercourse tends always to destroy." Of this *esprit de corps,* a recent and admirable example is stated by Dr. Kennedy of the Bombay army, to have been evinced by the sick of her Majesty's 2d and 17th regiments :—"On the night before the storming of Ghizni, these gallant fellows had nearly risen in mutiny on their surgeons, and insisted on joining their comrades—none but the hopelessly bed-ridden remaining in the hospital tents." In the many discussions which have recently taken place on the condition of our army as compared with that of our allies, it is remarkable, that while, in many respects, our regimental arrangements have been lauded to the echo, this applause has stopped short at the point where, of all others, our practice is most conducive to the prompt and successful treatment of the sick, and, consequently, to the efficiency of an army.

The English army has excelled all others in the administration of its regimental hospitals; and Mr. Guthrie, who is well acquainted with their value, has, in his Clinical lectures, put the subject in a proper point of view—leading us to infer that the superiority of one description of hospital to the other, is sometimes determined rather by military than by medical reasons. He adverts to the Duke of Wellington's preference for general hospitals, and at the same time remarks that his Grace's good opinion, which he had the good fortune to possess, was gained by having always acted, whenever he could, in disobedience to the letter, but not to the spirit of the Duke's orders on this subject—that is, by retaining with their regiments all those men who were likely, by prompt treatment, to be speedily cured, instead of hurrying them by hundreds or thousands to general hospitals in the rear.

Having noticed some of the leading points most worthy of attention in the administration of military hospitals, it only remains for me, in order to complete the limited view of the subject here given, to advert to a proposal for the establishment of hospitals for officers upon foreign service. This is a measure which, although it has sometimes been partially acted

upon, particularly in the navy, has never yet been established in the British service on that general and extended scale calculated to ensure its advantages. Would there were room for the opinion that such a desideratum had never been experienced! or that the want of such an establishment had not been more fatal to the officers of the army than inconvenient to their medical attendants. The attention, however, of Parliament has been drawn to this subject during the present session, and it is to be hoped that a remedy will speedily be found.

More than forty years have now elapsed since the necessity of such an institution was ably advocated by Sir Arthur Brooke Faulkner, in a pamphlet written after the disastrous expedition to Walcheren. The pictures there given of the miseries incident to sick officers in billets are such as I apprehend the public is but little acquainted with. A field-officer so wretchedly accommodated as to render it necessary to remove him from his billet, almost *in articulo mortis;* another officer labouring under fever, lodged in a mill, the noise of which was so loud and incessant, as to prevent his physician from hearing his patient's replies to the questions put to him; a third, compelled to remain in the market-place, while his companion sought accommodation for him, and was ultimately glad to obtain it in an apartment over the tap-room of a common gin shop; a fourth, lying for four days upon the floor of a small dirty apartment, with the accumulated filth of that time unremoved. These, and a thousand minor evils, of which the experience of every army surgeon will furnish examples, are, I apprehend, enough, and more than enough to rouse us to a sense of the distress to which sick officers are occasionally subjected in their billets, particularly when deprived by sickness, incapacity, or misconduct, of the assistance of their servants.

When gentlemen are thus in want of the usual comforts and decencies of life, it were idle to dwell upon the futility of exhibiting medicine under such disadvantageous circumstances, or the impossibility of giving due medical attendance to sick officers distributed in billets over a large town. In such a situation it is impossible for the most zealous medical officer to

apply his talents, either with justice to his patient, or any kind of satisfaction to himself. "In the case of an officer affected with delirium, when it was dangerous to leave him alone even for a few minutes, I have been obliged," says Sir A. Faulkner, "more than once to remain a full hour by his bedside, while his servant was getting my prescription prepared. Thus was the time of the physician, which unfortunately could be but ill spared, consumed in performing the duty of a nurse."

The objections to the institution of a hospital for officers resolve themselves chiefly into the expense of such an establishment, and the opinion that such a species of accommodation would not accord with the feelings and habits of British officers. These objections are, I apprehend, altogether futile and imaginary. Were an officer offered the alternative of subjecting himself to a hospital stoppage, proportioned to the rate of his pay and the extent of his accommodation, or of providing for the expenses of his own treatment in quarters, it will not be difficult to decide which he ought to prefer on the score of economy; and there are few rational beings who would be disposed to prefer the gratification of false pride, and overstrained delicacy, to the restoration of health and the security of life. It would be a bad compliment to the good sense of British officers to suppose that they would fastidiously reject a measure which has been advantageously adopted in the armies of our late rivals; and we are indebted to Sir A. Faulkner for obtaining an account of the accommodation provided for officers in the military hospitals of France. Annexed to Sir Arthur's pamphlet is a letter from Boudriot, surgeon-major of the French army employed at Middleburg in 1809, in reply to one addressed to him requesting information on this subject. Boudriot's letter is reprinted in the sixth volume of the Edinburgh Medical and Surgical Journal, and the following is a translation of the first three paragraphs—the rest of it being occupied by details into which it is at present unnecessary to enter:—

"1. There is in each garrisoned town in France, and in a place singled out as the most healthy, a building known by the name of Military Hospital, of a handsome and good construction, the wards of which are lofty, well white-washed,

and furnished with parallel windows, which are easily opened and shut at the pleasure of the officers of health.

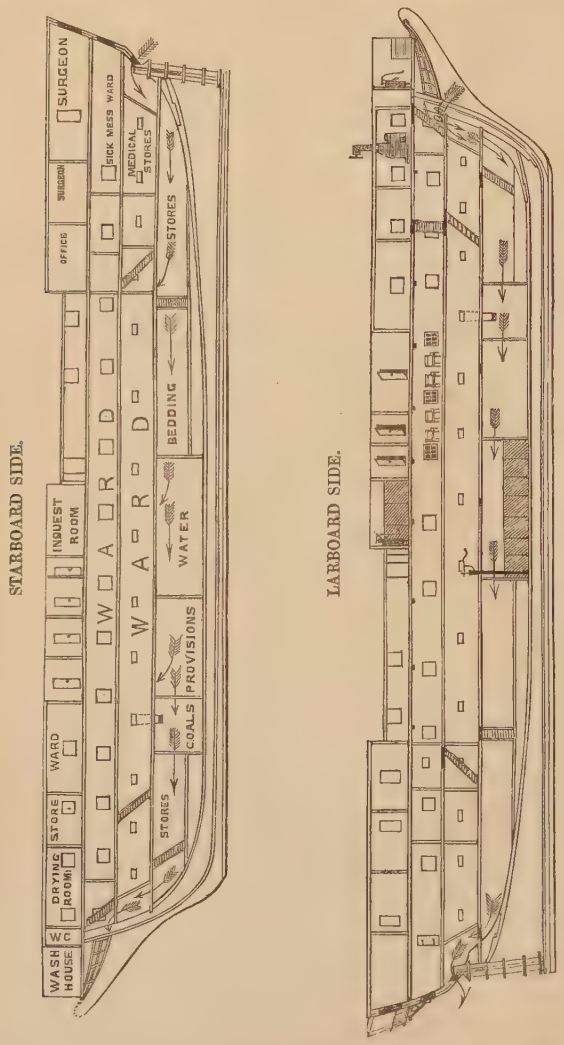
" 2. In the same hospital there are always one or two pavilions, destined exclusively to receive the officers of all ranks, although nevertheless they are at liberty to cause themselves to be attended (treated) in the house which they inhabit, and always at their own expense.

" 3. The officers' ward must be furnished with beds constructed in the most careful manner possible, and distant three French feet from each other, according to the regulation; separated by curtains, for decency, and in order to be enabled more easily, according to circumstances, to establish a current of air."

The fitting up and employment of hospital ships has not hitherto, upon any service, met with that countenance and consideration to which it appears to me pre-eminently entitled. I believe all will now admit the advantages which might have been derived, during the winter campaign in the Crimea, had a few of the ships of the Black Sea fleet, which secured its own inactivity by its own overwhelming power, been fitted up for the transport of the sick and wounded, and for the relief of the over-crowded hospitals on the Bosphorus. Ships offer at once one of the most important of all accommodations for the sick—perfect mobility, and the facility of changing position. Amongst many instances of improvement of the health of crews generally, and of the sick in particular, by getting under weigh, I will only refer to the one mentioned in Hennen's Medical Topography of the Mediterranean, of the fleet which anchored at Gibraltar, after the battle of Algiers, and when the most obvious good resulted from that fleet putting to sea when threatened with sickness, and hospital gangrene amongst the wounded.

The fitting up of a ship for hospital purposes, consists essentially in taking out her guns, and substituting bedsteads, cots, or hammocks; clearing away the bulk-heads; and removing every thing which can impede the cleaning and ventilation of the ship. If to be permanently employed in this way, numerous accommodations may be provided upon the upper-deck, as represented in the wood-cut, giving a

sketch of a thirty-six gun frigate, fitted up in this way, for which I am indebted to Dr. J. D. Burns of the Royal Navy, sometime surgeon of the Unité convict-ship, moored off Wool-



wich. The figures are upon too small a scale to enable me to mark successfully the whole of the accommodations; but it will be seen, that on the starboard side some of the cabins.

or apartments erected on the upper-deck, are marked off—the lower-decks being converted into wards for the patients; and a frigate of this description will accommodate easily three superior officers, eight junior officers, and about eighty-two patients, with servants, nurses, and workmen.

The arrangements for the sick, and the supplies for their use in the Minden, which was fitted out as a hospital-ship for the coast of China, are briefly noticed in the Dublin Medical Press for November 1842, from which some idea may be formed of the stores necessary for a service of this kind. In the valuable code of "Regulations and Instructions for the Medical Officers of the Fleet," for which I am indebted to Sir William Burnett, it is directed that, for the better accommodation and comfort of the sick and wounded on board Her Majesty's ships, a sick mess should be formed under the superintendence of the surgeon, and a scheme of diet is laid down, both for the sick on ship-board, in the marine infirmaries, and in the great naval hospitals.

The ventilation of ships, so important to the health of the seamen, may probably be greatly improved, by substituting for the old windsail, the ingenious contrivance of Captain Warrington, a species of fanners, by which stagnant air may be removed from the holds, beds, and store-rooms, where deleterious gases are likely to accumulate. Of this mode of ensuring ventilation I have been favoured with an interesting account by Dr. Wilson; and on this point his introductory remarks to the "Statistical Reports on the Health of the Navy," compiled under the supervision of Sir William Burnett, and the "Illustrations of Ventilation," by Dr. Boswell Reid, including the details of his plan for ventilating the steamers employed in the Niger expedition, and the Minden hospital ship, may be consulted with advantage.

TRANSPORTATION OF SICK AND WOUNDED.

The principal assistance heretofore afforded to the surgeon in the execution of his duties, either in the field or in quarters, consists in the appointment of a few orderlies, from regiments, and these, for the most part, neither adequate in number, nor efficient in point of activity and intelligence. It is not indeed to be expected that commanding officers of regiments, upon whom the surgeon is dependent for this kind of assistance, should be disposed to part with that description of men best qualified for the duties we have in view. The number of men often withdrawn from the ranks, by duties of fatigue, and casualties incident to the service, is materially increased by the number necessarily employed in attendance upon the sick—an attendance which should not be left to be provided for on the spur of the moment, but should be established and organized on a liberal scale.

For this purpose, the only effectual provision seems to be, the formation of a Hospital Corps, placed entirely at the disposal of the medical staff, and consisting of men either enlisted and embodied solely with this view, or transferred to the hospital establishment after having gained a character for steadiness, activity, intelligence, and, above all, for sobriety. A few years' service in the ranks I consider to be rather a recommendation; they there acquire a facility of helping their comrades, and a fertility of resource under difficulties—they acquire, in short, that knowingness which is readily conceded to an old soldier. A body of men of this description, trained to the particular duties required of them, qualified to attend the sick in the hospitals, as well as to succour and bear off the wounded in the field, would preserve the integrity and effective force of regiments; would afford a degree of comfort to the sick and wounded, to which they are too often strangers; and would give an efficiency to the medical staff, which the most zealous devotion to the duties of the service cannot otherwise ensure. It has been well observed by Mr. Guthrie, that "a

surgeon without his apparatus and equipments, is little better than a battery of artillery without ammunition." From the way in which this desideratum has been forced upon the attention of the public in the present war, at the eleventh, or indeed long after the eleventh hour, it is to be hoped that an effectual provision will be hereafter made for the succour and transport of the wounded.

We find the Duke of Wellington, in his general orders, cautioning the commanding-officers of regiments, and the officers and non-commissioned officers of companies, to take care that no man falls out of the ranks, under pretence of assisting the wounded, who is not ordered to do so by his officer; and that no more men are employed on this duty than are absolutely necessary to perform it. In all armies there are men who, although they may have passed their previous lives without manifesting any particular sympathy for the misfortunes of their neighbours, become wonderfully compassionate to a wounded comrade on the field of battle, particularly when there is a check, or the probability of a reverse—"precisely the moment when their presence in the front, and not their sympathy for their comrades going to the rear, is required." Mr. Alcock states that he once observed "in less than an hour, a whole battalion tail off after some fifty wounded, one carrying his comrade's musket, and another his little finger!" "The feeling of humanity," says Dr. Jackson, "which prompts one soldier to give assistance to his comrade, or his officer, when wounded, has sometimes given a colourable pretext to another for turning his face from the enemy. One firelock is withdrawn from the line by the wound of the soldier; a second by the impulse of humanity; and a third, perhaps, by the force of example."

The importance of this subject seems to have been duly estimated by Baron Percy, who has justly observed "that the first want of a warrior severely wounded in battle, is to be withdrawn from the *mêlée*, and transported to a place where he can receive the succour which his wounds demand." To this distinguished surgeon the French army was indebted for the first organization of a hospital corps, "Soldats d'ambulance;" and Percy was found to join example to precept, for upon one occasion he—the chief surgeon of the army—was to be seen retreating across the Rhine, carrying on his back Lacroix, an officer of engineers, dangerously wounded. The bridge was

battered by the Austrians with twelve pieces of cannon, and the French army, which had already gained the opposite bank, delighted with this noble action, encouraged with their cheers the generous efforts of Percy, under whose feet the pontoon was falling to pieces.

The carriages employed for the sick naturally resolve themselves into two kinds; those carried by men—what may be termed hand-bearers, or litters; and into wheel-carriages, or those drawn by horses or bullocks. Of the former, the looped blanket is one of the most simple expedients. This may be formed by attaching loops to the two opposite edges of a common soldier's blanket; the blanket is then doubled upon itself, one pole or pike passed through the doubling, and another through the loop-holes in the outer edges of the blanket. A similar bearer has also sometimes been formed by bottoms of canvas ticking, with poles made on purpose to support them. Both these forms of bearers, however, being without traverses or stretchers, are found exceedingly defective; the weight of a patient sinks down the yielding blanket or canvas so as nearly to reach the ground, while the poles are pressed in upon the haunches of the bearers, so as to hamper them in their movements, and to render it impossible for them to proceed either with ease or celerity.

These objections are completely obviated by the ingenious contrivance recommended by Dr. Millingen, which is figured in the frontispiece of his work, and of which a model has been shewn in my class for several years past. It is quite akin to the bearer (*branchard*) described in the "Dictionnaire des Sciences Medicales," and consists of two parallel poles, separated by two traverses or stretchers, with short legs, and supporting a canvas bottom. The poles of these bearers, when not employed for this purpose, and armed with pikeheads, form weapons of offence and defence to the men of the Hospital Corps when escorting wounded, or guarding hospital stores or provisions. Each individual of this corps should be armed with one of these pikes, furnished with one of the traverses strapped upon his knapsack, and one of the canvas bottoms girt round his waist; and any two of them meeting together, will be enabled, in a few minutes, to equip a light and efficient bearer, capable of carrying off a wounded man with all the comfort of which his situation admits; his pack being placed under his head as a

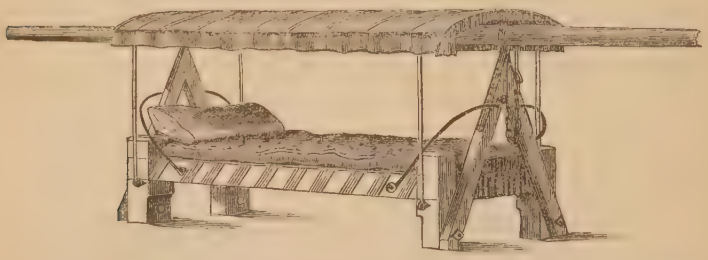
pillow, and his firelock slung from the side of the bearer by means of loops attached to it for this purpose. Dr. Millingen also proposes, that each transporter should be furnished with sling-belts, such as are every day to be seen upon our chairmen in the streets, by which the bearer will be slung from the shoulders, and thus more easily carried. The more minute details of this equipment will be found in Dr. Millingen's work; and at present I shall only observe, that it appears to me one of the most simple, efficient, and practicable contrivances for the conveyance of the wounded which has yet been devised. A bearer somewhat akin to this was proposed by the late Colonel Crighton of this place, which is figured in the first volume of the Edinburgh Medical and Surgical Journal. It consists of a piece of frame-work, borne, like the former, upon two poles, supporting a tilted cover, and having a small cot or hung bed suspended under it, in which the patient is placed.

In a work entitled "Notices sur le Service des Ambulances de l'Armée Suédoise," for which I am indebted to Dr. Retzius of Stockholm, there are figured several conveyances in use in the Swedish army, and amongst others this conveyance formed by two soldiers' muskets instead of poles, and a canvas bottom.

And now that the sergeant's halbert is done away with in the British service, it seems deserving of consideration. An extempore conveyance of the same kind, first brought to my notice by Mr. Tufnell, is known to some old soldiers. It may be formed by using a soldier's great-coat, with the muskets

passed through the sleeves; these are turned inside out, and the body of the coat forms a bottom supported by the slings of the firelocks, which are taken from the stocks, and passed transversely between the two muskets.

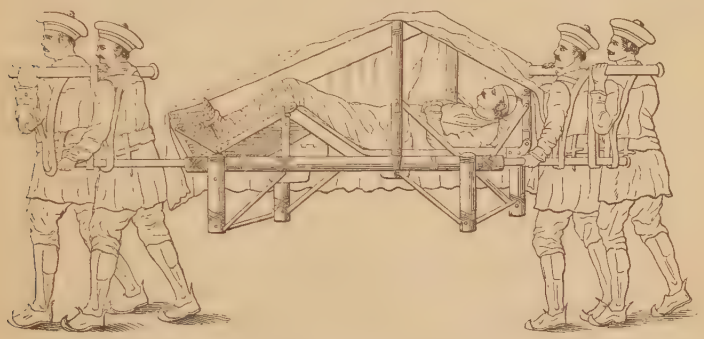
The only other conveyance of this kind I shall notice, is the Dooly, which is very generally used in the Indian army. This varies somewhat in its form in different parts of the country. In some cases it consists simply of a cot, or rather hammock, suspended from a bamboo, and screened by an awning from the sun, when it obtains the name of a Muncheel, and which I have seen used in the Bombay army. In other cases it consists of a more finished piece of frame-work, covered by painted canvas, so as to protect the patient from the weather, and calculated to let him lie at length within it. A model of the dooly used in the Madras army, in my time, and various other plans and models of these contrivances, for which I am indebted to several medical officers, are deposited in the museum of the class. I am indebted to Dr. Dempster, Deputy Inspector of Hospitals, for a well-constructed model of the



dooly in use in the Bengal army. This, with the addition of a curtain or canopy thrown over it, which is not represented in the woodcut, forms an excellent conveyance. It is simple in its construction, affords more facility of access to the patient than many of the doolies heretofore in use, and either with, or without the top, which may be removed with perfect facility, forms a good bedstead, and seems to me to leave little to be desired in a contrivance of this kind. Nothing can well be conceived more perfectly adapted to the conveyance of sick than doolies or palanquins: but the number of bearers required for them renders it impossible to bring them into general use in the armies of Europe.

I am in possession of a very interesting "Memoir on the

Field Service of Sick and Wounded Soldiers in the Bengal Army," by Sir John Login, formerly surgeon to the British Residency at Lucknow. In this he proposes to substitute for the common dooly a litter constructed of very light materials —bamboo and cane—strongly bound together at the joints by thongs of green hide. Sir John Login has kindly furnished me with a model, and numerous sketches, illustrating the construction of this litter, which has been shown in the class of military surgery for several years past. The more important



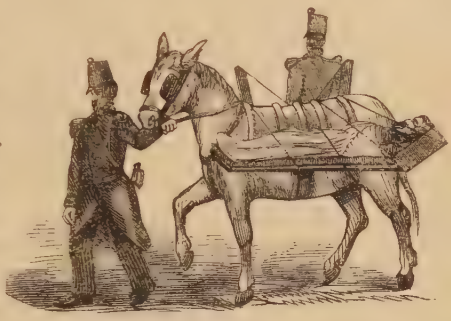
features of this contrivance seem to be its comparative lightness, weighing only 70 pounds weight, while that of the common dooly is stated to be 120 pounds—its adaptation to moving wounded men up or down a rapid declivity, keeping the patient in either case in a horizontal position—the facility with which such litters may be packed up and carried in numbers on camels or other beasts of burden, when not in use, and, above all, its adaptation to the kind of carriage which can be most readily procured, whether men, elephants, camels, mules, ponies, or carts. The latter property suggests at once a most important relief to the armies of India by enabling them, on many occasions, to dispense with a host of followers in the shape of dooly bearers—an insubordinate set,—notorious for marauding—often known to desert in the face of an enemy, or when brought under fire; and above all, an intolerable burden on the commissariat. Instead of these men engaged solely as bearers, Sir John Login proposes to entertain an organised body of hospital lascars—men trained to many useful duties about the sick, whether in the field or in quarters. And when

it is considered that the proposed litter may be carried, like a common hand-barrow, by two men instead of four, it will be seen that, even when employed exclusively as bearers, the number of followers may be diminished by one-half. This equipment was brought partially into use at Gwalior; but in consequence of its being introduced in an imperfect state, and the followers inexperienced in its management, some prejudice was created against it. It has however been favourably reported upon by several officers of standing and experience, amongst others, I believe, by the late Sir Charles Napier, and was first brought to my notice by Colonel John Low of the Madras army.

Before describing the wheel-carriages used for the conveyance of sick and wounded, I would solicit attention for a moment to an intermediate description of carriage, neither borne by men nor drawn by horses; I allude to the mode of conveyance used in some cases by the French army in Egypt, upon the backs of camels. In the first volume of Baron Larrey's Memoirs, there is a plate representing the necessary equipment for this mode of transport. It consists of two large boxes or camel-trunks, fitted up as litters for the reception of the wounded, and slung, one on each side of the animal, over a pack-saddle. The camel is made to kneel, as in other cases, to receive his load, and thus the sick may easily be placed in such a conveyance. Camel litters, altogether akin to those used by Baron Larrey, are described in Brett's "Surgical Diseases of India;" and again, described and figured, along with other conveyances, in a recent pamphlet by this author. In Major Hough's "March of the Army of the Indus," we have the following description of what are termed "Khujawahs," a kind of hamper, or camel basket, used, it would appear, in Affghanistan, for carrying fruit, and occasionally fitted for travelling in:— "These were made of a wooden frame-work, about four and a half feet long, by three and a half broad, with a seat at the back for two men. The sides of the frame-work were filled up with gunny cloth. Each camel carried two Khujawahs, one on each side, so that each camel carried four sick men." This is not represented as a comfortable conveyance, and although in a country where the camel is the only beast of burden, we may be again under the necessity of having recourse to this mode of carriage, the peculiar gait of this

animal is not well adapted to the comfort of a wounded man. Amongst others who have been inconvenienced by it, Bonaparte is said to have experienced a sensation like sea-sickness, from riding on the back of a camel.

The mule conveyance represented in the woodcut, has been extensively used in the French army during the present war in the Crimea; and upon one occasion, under the pressure of excessive sickness in the British camp, we were largely indebted to our kind and generous allies for the use of this conveyance in transporting the sick to Balaklava.



In Larrey's Memoirs there is a figure of what is termed the ambulance of Baron Percy. This is a four-wheeled carriage of a very simple construction. It consists chiefly of a sort of ridge-pole raised upon the frame-work of the carriage, and upon which the wounded are placed astride, as if on horseback, and here they sit protected by a canopy. This can only accommodate men slightly wounded about the head, superior extremities, or upper part of the trunk, and is evidently unsuited to men who may have received severe wounds or fractures of the lower limbs.

In the account of the Italian campaign, in the first volume of his Memoirs, Larrey describes two voitures or spring-carriages of his own invention—one with two and another with four wheels. The smaller one, of which I possess a model, is thus described by the Baron :—"The chest or body presented the shape of an elongated cube, arched on the top. It was pierced by two small windows in the sides, two folding-doors opening before and behind; the floor of the carriage was formed of a movable frame, furnished with a hair mattress and pillow, covered with leather. This frame glided easily upon the two supports or cheeks of the body, by means of four small castors, and it was provided with four iron handles fastened into the wood. These handles were destined

to receive the belts of the soldiers, in order to carry the wounded upon the frame as upon a barrow. The wounded could be dressed upon these frames, when the season did not permit them to be dressed upon the ground. The little vehicles were drawn by two horses—one of which carried the driver. Internally they were 11 decimeters, 12 millimeters, (or 32 inches) wide. Two wounded could lie all their length in them easily. Bags were distributed in the inside of them to receive bottles or other objects necessary for the sick. These carriages combined solidity with lightness and elegance." The larger one was constructed upon the same principles, was calculated to convey four patients lying extended, and was drawn by four horses.

This ambulance for the service of the French army has been much modified since the Baron's time. When in Paris several years ago, I had an opportunity of seeing, at the Magazine Centrale, a Caisson for the "service des ambulances. adopté par decision ministerielle du 21 Avril 1845." This contains numerous compartments charged with dressings, bandages, and surgical apparatus, of which it carries a large supply, but affords little accommodation for the wounded—their conveyance being more entrusted to the carriages of the country. I am in possession of sketches of a conveyance employed by M. Vanheddeghen in the mountainous parts of Algeria, and found very serviceable in the transportation of the wounded; and a similar carriage was, I believe, extensively used in carrying the wounded through the streets of Paris during the late insurrections. This resembles the carriage known in this country as the Albert car. The sick or wounded, of whom the vehicle can contain four, sit or recline back to back, two on each side of the central board or partition, over which an awning may be spread.

The only conveyance heretofore in general use for the sick of the British army were the common spring-waggons. They were supported on four wheels, and drawn by four horses; calculated to convey six or eight men with slight injuries, and to hold two lying extended horizontally. Their general outline bears considerable resemblance to the carriage just described from Larrey's work, but they were much less commodiously fitted up in the interior. Some of them were

floored with deals like a common cart, and others had a depression or well in the bottom, calculated to receive the men's feet, and enable them to sit upright with more comfort. These vehicles were, however, but indifferently calculated for the conveyance of the wounded; and from the expense of their construction, and the establishment of men and horses necessary to render them efficient, proved a very cumbrous and unwieldy appendage to an army.

The inconveniences of the spring-waggon have led to the suggestion of other descriptions of carriages intended to supersede it in whole or in part. With this view a regimental long car was proposed by Dr. Millingen, of which a small figure is given in the frontispiece to his work. These cars are calculated to be drawn by two horses, and to move to the rear, with facility, ten or twelve men each, wounded in the head, face, upper extremities, and lower extremities without fracture, together with their arms, packs, and accoutrements.

"The cars here proposed are similar in construction to those vehicles commonly called in Ireland jaunting cars. They should be mounted upon four wheels, narrow, and sufficiently long to accommodate six men on each side, seated back to back, their feet bearing upon a splash-board, outside of the wheels—their packs, &c., placed in the centre of the car. These carriages might also be constructed of the length of the continental long ammunition tumbrils, and, with three or four horses, could bear off 24 wounded at a time.

"The body of these cars would also carry each regiment's field hospital bedding, consisting of 12 palliasse and bolster-cases, 24 pairs of sheets, and only weighing 96 lbs. The comfort and advantage arising from the possession of these stores cannot be sufficiently appreciated. When troops are moving at a distance from the theatre of war, these cars might also carry 12 rugs, weighing about 88 lbs., and upon a march would convey sickly men, and the packs of those who are unable to bear them with their companies."

Such carriages as these would prove a most valuable addition to the means of transport hitherto afforded to regiments; but by far the most ingenious contrivance for the conveyance of sick and wounded which I have seen is that of the late Mr. Cherry, Principal Veterinary Surgeon of the Army. This

gentleman's "Observations on the Defective State of Army Transport, with Suggestions for its Improvement," show that he has considered the subject in all its bearings, and that his observations are the result of sound judgment and matured experience. I shall therefore make no apology for introducing the following extensive quotations from his work :—

"The transport required by every army, independent of the ordnance service, which has its own peculiar establishments, may be classed under two heads ; namely, that which is requisite to carry provisions, forage, and the ordinary supplies ; and that which is requisite to carry sick and wounded men ; or, in other words, into Commissariat and Hospital transport.

"But although the transport required by an army admits of being classed under these two heads, yet they again, in a great measure, resolve themselves into one, and require but one species of transport to supply both ; more especially during an active campaign, when transport is most valuable, because the wants of each exist, principally in opposite directions ; stores and supplies of all kinds requiring to be carried to the front, and sick men to the rear.

"The most simple, and at the same time the most really efficient, carriage that can be employed for military transport, is a light cart drawn by one horse, and which, with little ingenuity, may be constructed to carry either the weighty and bulky articles that are required by an army, or sick and wounded men, with greater comfort and ease than can possibly be afforded by the spring-waggon."

Mr. Cherry's objections to this last-mentioned mode of conveyance are detailed at length, and are for the most part, I think, exceedingly well founded. He very justly observes, that "the ease and comfort procured to the sick and wounded soldier, in a spring-waggon conveyance, does not equal what it is sometimes supposed to do ; and therefore cannot on that score be said to compensate for any additional burden or expense.

"The ease," says he, "resulting from the elasticity of springs to a carriage particularly belongs to rapid motion over made roads. In very rough situations their effect is lost ; and, under the most favourable circumstances, the production of ease depends upon a proper adjustment of the strength of the springs to the weight to be carried on them.

The worst cases of sickness or wounds, of course, require the most ease in being moved; but in spring-waggons they receive the least. The waggon is calculated to carry seven or eight men with ordinary complaints, and with the weight of these the springs may act; but when the waggon is occupied by one or even two men, who when very ill or badly wounded, are fully sufficient to occupy an entire waggon, their weight does not act on the elasticity of the springs, and they would ride quite as easy in a carriage without any. Was the strength of the springs again adapted to this lesser weight, their elasticity would be overcome by the greater, so that in either one case or the other the persons conveyed in spring-waggons are placed in a similar situation to what they would be on a carriage without springs."

After noticing the impediments which not unfrequently occur to the movements of troops, from the breaking down or sticking fast of waggons in bad roads, bridges, hollow ways, or other narrow passes, and the difficulty with which these unwieldy conveyances are removed, he observes, "The addition of one spare horse to a cart doubles the power to get over any road particularly bad; but in the case of waggons, even the adding of four horses, where it is practicable, to those usually allotted, increases but little the power, from the unwieldiness of so numerous a team, and the difficulty of making so many horses draw together. Again, over rocks or any occasional impediment, where the strength of a few men would be lost on a waggon and its lading, the same means applied to carts would surmount the obstruction with ease.

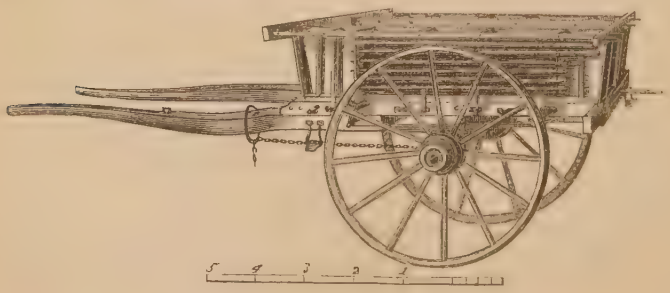
"When one horse, in a set of four, fails in strength from sickness or any other cause, the consequences extend to the other three horses of the team, inasmuch as increased exertion is required from them to make up for the defective horse. The tendency of this is to knock up them also; and a whole team, together with the waggon, has frequently been rendered useless from the failure of one horse."

These inconveniences, arising from the failure of a team of horses belonging to a waggon, are also sometimes experienced from the failure of the men employed to drive them, of which, amongst other instances, one rather ludicrous than serious occurred to myself in France. When about to march

off one morning from the village where we had halted during the night, the hospital sergeant came up to me in great distress, to say that the sick could not be moved; that one of the waggon-drivers had deserted during the night, leaving one of his horses without shoes, and that the other driver was, as he termed it, a sort of an idiot. Upon inquiry I found that the hospital cook, a Yorkshire man, among his other acquirements, knew something of the management of horses. He was immediately put in requisition as a waggoner, had the horse shod by the village blacksmith, and got the waggon under weigh amidst the jokes of his comrades.

It will be obvious, upon a moment's reflection, that such accidents as this occurring either from the failure of horses, or from the desertion, sickness, or incapacity of drivers, are much more easily remedied in cases where carts are employed than when waggons are the only means of conveyance; for "when the weight of a load does not exceed what one horse is able to draw, skill in a driver ceases to be requisite, and it may be led by any man, however inexperienced. Neither man nor horse require instruction. From the moment the horse is purchased, or the man enlisted, they become serviceable, and of course efficient augmentations may be made without occasioning the expense and delay that attend every extension of a waggon establishment."

After these and many more interesting observations on the subject of military transport in general, Mr. Cherry concludes by observing, that he has at length succeeded in completing this carriage, a machine sufficiently near perfection to be sub-



mitted to a trial of its advantages, which he enumerates in his pamphlet, and which may be seen in my introductory lectures.

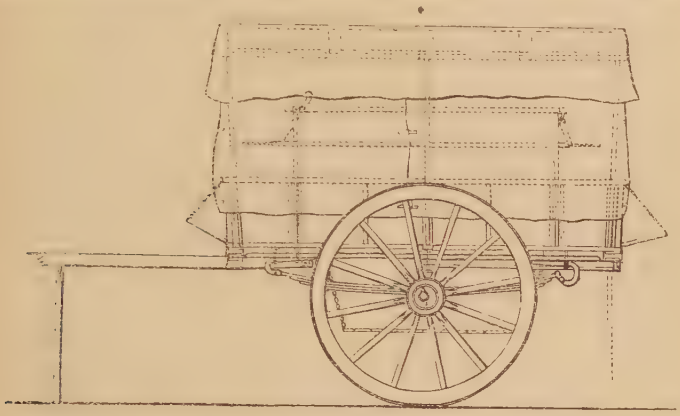
along with the official reports upon this conveyance from the late Dr. James Forbes, and other experienced officers, both military and medical, at Chatham. It is a light single-horse cart, so constructed as to be readily adapted either to the carriage of stores and provisions, or to the conveyance of wounded men; for these two different purposes a great part of the frame-work of the cart is movable, and capable of being adjusted to the object required. In the state here represented, this carriage is adapted to the conveyance of provisions; and it will be observed that a number of movable spars or poles are stowed on the outside of the cart, which may in a few minutes be unpacked and placed upright round the frame-work, adapting it to the carriage of bulky articles of forage, such as hay or straw. Some

of these spars, again, are fitted to be placed as ridgepoles on the top of the uprights, for the purpose of supporting a canopy for the protection of the sick or wounded. It now becomes a most commodious sick-cart, capable of conveying one person lying at length on a bearer within, or four men sitting erect on seats, which are suspended from a rope running round the interior of the cart, and giving the advantage of its elasticity in addition to the springs. The seats, when not used for this purpose, form a movable part of the bottom of the cart, under which are boxes for containing the bearer and canopy when not wanted for their respective purposes. The most ingenious part of the contrivance is that by which the ordi-

nary springs of a cart or other carriage may be protected from injury when carrying heavy loads, while at the same time it admits of their free use when light loads are carried. This is effected by two movable blocks sliding along the axle-tree ; and which, by means of a lever connected with them, may either be moved outwards under the frame-work of the cart, so as to make its weight bear directly on the axle without injuring the springs, or, by turning the lever in an opposite direction, the blocks may be withdrawn from under the side-pieces of the cart into the hollow space formed by their thickness, and the springs thus again brought into action. This is represented in a plate contained in the 38th volume of the "Transactions of the Society for the Encouragement of Arts"—the silver medal of which society was awarded to Mr. Cherry for this part of his invention. The woodcuts give but an imperfect idea of the ingenuity of this contrivance, and the variety of purposes to which it is applicable ; but these are perfectly intelligible from the model which I have had the pleasure of showing to my pupils for many years past, and which Mr. Cherry was kind enough to present to the museum of the class.

Many of Mr. Cherry's general principles for the arrangement of military transport appear to me unquestionable ; and, independently of the ingenuity displayed in the construction of his cart, he deserves great praise for having done so much to excite reflection and inquiry into the details of a subject, the importance of which has not hitherto been duly appreciated—reflections which cannot fail to terminate in the conviction, that "the transport of wounded from the scene of action is an affair of no small importance and difficulty in the operations of all armies, not only involving the lives and welfare of the maimed, but sometimes affecting directly, at others indirectly, the whole corps d'armée." I cannot help thinking that if Mr. Cherry had been alive, or left any one to fight his battles, his views would have met with greater consideration in the recent campaign, and that his cart, or a modification of it, such as that which I have seen at the Shrewsbury Infirmary, presented to his county hospital by the gallant Lord Hill, would at least have had a comparative trial with others. Of the two carriages originally despatched with the army to

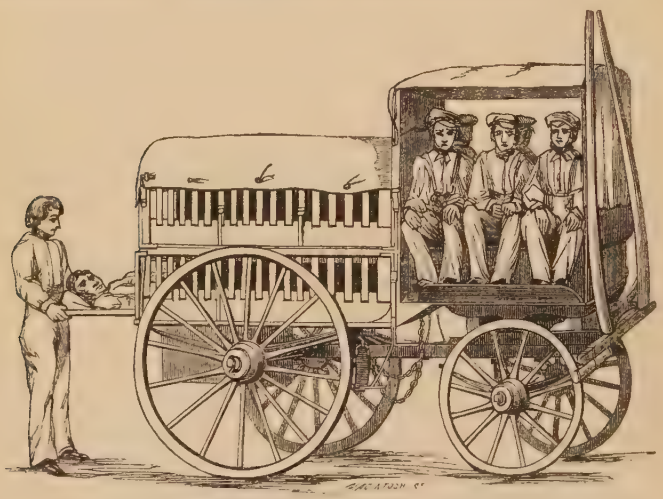
Turkey, the one figured here is that proposed by Mr. Guthrie, of which he gives the following description :—"A Hospital Conveyance Cart runs on two wheels, corresponding with



those of the Artillery. It is covered with a white painted canvas, has curtains of the same material all round, and an apron attached to the footboard before and behind. Each cart carries under the seat in front, a small chest of utensils, two sets of iron splints in boxes, and a small box of surgical stores, with a strap attached for the convenience of carriage, a lantern for oil, pickets and ropes for the horses, a pickaxe, spade, saw in case, ten stretchers or bearers, with appropriate slings, two empty ten-gallon casks hung underneath for water, a bag with hammer, nails, two brass cocks for the water casks, and four horse-shoes. A filter made of gutta percha (Owen's patent) in a wicker case and sling, capable of yielding near fifty gallons of clear water in twenty-four hours when in use, and weighing 18 lbs., including a funnel and a pint drinking cup; a water bucket for the horses, and a small camp kettle for three men. Two spare springs and one spare axle are carried for every three carts in the store waggons.

Ten of these carts have round tops or covers, ten have flat ones; the ten round-topped carts have seats inside, and will carry sixteen persons; the ten flat-topped carts carry two bearers on vulcanized springs and rollers on the floor of the cart, and nine persons before and behind—in all

eleven, and a twelfth may be added on a bearer slung to the roof. These carts might also have side seats, to be raised if necessary, when the bearers on the floor are not required. On drawing out two iron supports at the end of each cart, the front seat, which is movable, makes a table when placed upon them, for operations or other purposes." Of this I am inclined to think the more favourably, simply because it is a two-wheeled cart, and capable, I presume, of being drawn, for a short distance at least, and with a light load, by one horse. It is the design of a man conversant with the exigencies of the service, and it will be seen that provision is made for all the appurtenances which are necessary to keep an equipment of this kind in a state of efficiency.



This carriage, again, is the design of Dr. Smith. It seems to have been generally employed, and is favourably spoken of by several of the surgeons who have served in the Crimea. Having no personal experience of some of the conveyances more recently proposed for sick and wounded, it is with great deference that I express an opinion on this subject; but for the immediate removal of the wounded from the field where they have fallen, some of the stretchers, hand-bearers, or litters, must be employed; where there are no roads, or only what is, in this country, termed a bridle-road, the mule conveyance would seem to be a very eligible one;

where the roads are narrow, or imperfect, the single horse cart is, for the reasons fully stated in Mr. Cherry's pamphlet, to be preferred; and again, where the roads are good and the distances long, waggons will probably be found the most expedient conveyance when the sick and wounded are numerous. Were our means of conveyance more perfect, regiments would be less frequently compelled to leave their sick behind, and we should find that sick and wounded may be moved, not only without inconvenience, but often with positive advantage. Gestation has even been advocated as a remedy in the treatment of fever by two experienced army surgeons, my late venerable friend Dr. Jackson and Dr. Jones, formerly surgeon of the Greys; and although my own experience does not enable me to speak to its effects in this particular disease, I have frequently had occasion to observe the improvement of cases in the course of a march.

Mr. Alcock, in his notes on the organization of the Hospitals of the British Legion in Spain, has not only given us a lively and accurate picture of the miseries to the wounded, and disadvantages to the service, which have hitherto been experienced from an insufficient equipment for the medical department of armies and the conveyance of the sick, but he has also pointed out the beneficial results of a better arrangement. After detailing the manner in which he succeeded in establishing a "Corps of Transport," and a "Hospital Corps," he states that a month had not elapsed after these arrangements were made before the general hospitals assumed an improved appearance. The utmost order, regularity, and cleanliness were maintained in every division; every man soon knew his duty thoroughly; and the hospitals became a source of pride to all connected with them. These arrangements proved beneficial in the extreme, and acted not less favourably upon the inmates of the hospitals than upon the effective force in the field.

There is a committee now sitting at Woolwich on hospital conveyances, and I have reason to know that a bearer, proposed by the Messrs. Holmes of Derby, who have been extensively employed in manufacturing carriages for the Crimea, is highly approved of, particularly for the removal from the field of patients whose limbs have been amputated. The mule

litter and chair of the French, with some little modification, is also approved of. Of wheel carriages, a modification of the jaunting car, and light spring waggon, capable of carrying eight wounded —six sitting and two lying horizontally—have, I believe, met with the approbation of this committee.

From the foregoing observations it will be seen that the duties of an army surgeon are not solely those of a medical man, and that many of the subjects of his attention are not exclusively of a professional nature. The examination of recruits; the clothing, victualling, and exercise of troops; their accommodation in camp and in quarters; their management in hospital, independently of considerations purely professional; and the means of transporting them when sick or wounded, ought to be objects of unremitting care; and the numerous medical authors, both ancient and modern, to whom reference has been made, will afford the best possible proof of the importance which has at all times been attached to these matters by every enlightened military surgeon. "De toutes les conditions humaines aucune n'a plus besoin des secours de la médecine que celle du soldat. Ce que la fougue de la jeunesse, la rigueur des saisons, les qualités vicieuses des alimens et les blessures les plus meurtrières peuvent produire de maux est rassemblé sur sa tête. Le choix des vêtemens, du regime, d'une habitation convenable, suffit pour lui conserver toute la vigueur et par consequent son courage qui ne peut exister sans elle."

Although noways disposed to underrate the importance of those surgical subjects on the consideration of which we are about to enter, I cannot conclude this introductory department of the course without observing that, in the words of Johnson, "war has means of destruction more formidable than the cannon and the sword. Of the thousands and tens of thousands that have perished, how small a proportion ever felt the stroke of an enemy!" At the same time it is consolatory to reflect that even in seasons the most inclement, under privations the most severe, in climes the most ungenial, and encampments the most unwholesome, the resources of our profession have been successfully opposed to the disasters inseparable from the pursuit of war.

SURGICAL DISEASES OF SOLDIERS AND SEAMEN.

The subjects which naturally present themselves to our attention in the surgical department of this course, are those accidents and diseases to which soldiers and seamen are particularly exposed, and to which they are professionally more or less liable in all parts of the world. In entering upon the consideration of these, it becomes necessary to offer a few words in explanation of the arrangement which I have been induced to adopt. In this arrangement, as in all systematic works in surgery, the subject of Inflammation occurs first. To this succeeds the consideration of Burns, Ulcers, and Hospital Gangrene, all of which are intimately connected with inflammation, either as a cause or consequence.

Burns are incident both to soldiers and seamen in a severe and dangerous form, from explosions of gunpowder. Ulcers are much less common in the service than they formerly were, but they are still met with in very aggravated forms upon some of our foreign stations. Hospital, or as it is sometimes termed, Traumatic Gangrene, is a disease occasionally supervening upon wounds and open sores, particularly in hospitals, and the treatment of which consequently becomes an object of much importance to every military and naval surgeon.

Wounds, in all their forms and bearings—in all the various situations in which they occur, and accompanied as they often are by adventitious circumstances rendering them more complex in their nature, and more difficult in their treatment—are a class of accidents of all others peculiarly interesting to those practitioners who may embark in the public service. The consideration of these injuries constitutes the most essen-

tial part of what is more strictly termed military surgery ; and to their treatment a large proportion of my observations are naturally devoted. Allied to the subject of wounds, and indeed often constituting the most formidable part of them, are Fractures of the bones, and Injuries of the joints, subjects which follow next in order, and which must indeed be in some measure incorporated with the doctrine of wounds. The severe operations which these injuries often require the military surgeon to undertake, leads us naturally to the subject of Amputation, in the consideration of which many important questions are involved—questions which must be discussed with a view to the peculiar circumstances of military life, and must sometimes be solved differently from what they would be with reference to private practice.

Ophthalmia, and the various diseases of the eye, have, unfortunately for the army, acquired a degree of interest to the military surgeon surpassed by no other disease ; and to many of the army surgeons, still alive, this interest was enhanced by attempts to question their capacity for this branch of practice, to exclude them from a fair competition with their brethren in civil life, and to intrude into this department of military surgery an individual who (whatever were his merits as a dexterous operator) was certainly not superior to his military competitors, either in judgment or in general success.

Of the maladies incident to those who indulge in promiscuous and illicit amours, soldiers have always had their share, and the Venereal disease, in all its Protean shapes, has ever been a subject of deep interest to the military surgeon, an interest which has been increased by the important revolution in the treatment of Syphilis brought about through the medium of the army surgeons.

The extent of Military Punishments, and the professional responsibility connected with their infliction, have been greatly diminished, in consequence of regulations at which every one must rejoice ; but while corporal punishment continues to be sanctioned by the British military code, it becomes the unpleasant duty of the surgeon to see it put in execution ; and it falls within my province, in concluding this department of the course, to offer a few remarks, calcu-

lated to guide the judgment in superintending its infliction, and in advising as to the extent to which this and other punishments may be carried without danger to the health of the individual.

INFLAMMATION.

A knowledge of the phenomena of inflammation, its causes, seats, terminations, and treatment, is so indispensable to the scientific and successful practice of surgery in all its departments, that it seems necessary to offer a few remarks upon it as an introduction to this department of the course. It is not, however, my purpose, nor is it within my province, to enter into the various theories of inflammation, or to give a minute and detailed explanation of those appearances which are observed in inflamed parts, but rather to confine myself to a few general observations on points of practical importance to the military surgeon. The valuable and instructive "Lectures on Inflammation," of my learned predecessor Dr. Thomson, are deservedly esteemed by the profession; and although, since the publication of that volume, views more or less original have been promulgated by Mr. James, Dr. Macartney, my colleague Dr. Bennett, and many others, yet nothing calculated to affect in any material degree the more important practical deductions has been adduced.

When inflammation is seated externally, so that the part affected is fully within the sphere of our observation, we find it affected with Redness, Heat, Pain, and Swelling. These are the most conspicuous and characteristic of the local phenomena of inflammation, and are more or less obviously connected with an increased determination of blood to the inflamed part.

In severe cases of inflammation the constitution becomes so far involved, that we have all the usual symptoms of fever accompanying the local affection, and this symptomatic fever is liable to assume every possible shape, from that which has been peculiarly denominated inflammatory, with strong vascu-

lar action, down through every variety of shade to the lowest form of typhus; it follows also the usual laws of periodical increase and abatement, sometimes nearly continued, at others remittent, or intermittent. We have this fever not unfrequently assuming a bilious character, particularly when connected with the form of inflammation termed erysipelatous, and it sometimes, even in this country, assumes all the characteristics of yellow fever. This is no doubt generally connected with, and indicative of, the existence of pyæmia; but how completely it assumes the character of yellow fever, the following remarks will show:—With reference to a case of this kind, I expressed myself as follows, in one of my Clinical lectures, addressed some years ago to the students of surgery in the Royal Infirmary, and printed for their use:—One symptom appeared early in this patient's case, which I did not fail to remark to my colleagues, and which, as far as my observation goes, is a circumstance almost uniformly foreboding a fatal termination; I allude to a peculiar yellow hue of the skin, which not unfrequently attends the symptomatic fever supervening upon wounds and operations. This has perhaps struck me more forcibly from being familiar with a similar appearance in the idiopathic fevers of tropical climates; and although I have no wish to alarm the citizens of Edinburgh by talking of a yellow fever in this part of the world, yet I am bound to state for your instruction, that I have occasionally seen it here as well marked as I ever saw it at Seringapatam or Batavia, and when supervening upon injuries, much more uniformly fatal.

A case occurred some years ago which made a deep impression on my mind, and which must have done so, I think, upon all those who had occasion to witness it: I allude to that of a seaman belonging to one of her Majesty's ships in the roads, whose limb had been amputated below the knee in consequence of an accident. The accommodation on board his ship was defective, and the vessel being about to sail, he was brought ashore to this hospital, and placed under my care; here his stump sloughed, the symptomatic fever ran high, was attended with that dingy yellowness of the skin to which I allude, and in a few days he died. I observed to the surgeon of the ship, who came ashore to see him dis-

sected, that this case wanted nothing but the *black vomit* to constitute a complete example of yellow fever; and it was found, on laying open the stomach, that this circumstance, necessary to complete the parallel, was hardly wanting; for here was a large collection of that dark grumous fluid resembling coffee grounds, which is so often evacuated from the stomach in tropical fevers.

There is one circumstance which perhaps more than any other has been held to be a criterion of the existence of inflammation, particularly when the inflamed part, being situated internally, the disease is not to be detected by any of the local symptoms conspicuous to our senses, namely, that particular appearance exhibited by the blood drawn from patients labouring under acute inflammation, and which has been termed the buffy coat or inflammatory crust. The appearance of the buffy coat is in a great measure dependent upon the slower coagulation of inflammatory blood, in consequence of which the red particles fall to the bottom of the vessel, leaving a portion of the surface of the crassamentum destitute of colouring matter. With reference to the presence of the fibrinous coat, we must particularly advert to the quick or slow stream in which the blood has flowed. In active inflammation of the fibrous texture the formation of the buffy coat cannot be prevented, because the fibrine in the blood is in great excess; but when inflammatory action is more moderate, we shall learn more of the nature of blood from examining its texture, than from merely viewing the surface of the coagulum. In general terms it may be stated that a firm texture of the blood points out a strong action of the blood-vessels, so as to give a presumptive sign that the bleeding has been proper, and *vice versa;* if the coagulum be remarkably loose in texture, we should question the propriety of repeating the operation.

The circumstances which give rise to inflammatory attacks may act either indirectly through the medium of the constitution or directly on the part affected; and where there is any fault in the constitution dependent upon disorder in any of the three principal systems of organic life, the alimentary, the vascular, or the nervous, this fault impedes the curative process in disease, and in inflammation gives rise to actions excessive in degree, or imperfect and faulty in kind. For

proofs and illustrations of the extensive influence of derangement of the chylopoetic viscera upon local disease, I must refer at once to the writings of Mr. Abernethy, who has demonstrated, in the most convincing and impressive manner, the important truth, that health and strength spring from a right performance of the chylopoetic functions, and that weakness and disease are consequences of their disorder and derangement. Similar views of the effects of derangement in the functions of the alimentary canal on those diseases falling more immediately within the province of the physician, have been taken by my late respected colleague in the Royal Infirmary, Dr. Hamilton, in a work, which, in my opinion, did much to simplify and improve the practice of physic, and to inculcate just notions upon this subject into the minds of the profession and of the public.

But while fully disposed to admit the paramount influence of the digestive organs in modifying the phenomena of disease, I am still inclined to give much weight to the following judicious observations relative to the vascular system, or to the blood itself, which are contained in an excellent "Essay on Inflammation," by Mr. James of the Exeter Infirmary. "An impure state of the blood exists perhaps more frequently than we are aware of; but as it is invariably connected with disorder of the digestive organs, the effects which partly arise from both causes are often exclusively attributed to one. But when I see persons in whom every scratch festers into a sore, as in scurvy or scrofula; when I observe that the atmosphere alone will change the disposition of every action; that poisons introduced, and acting upon, the circulating medium, will induce the most powerful effects upon the whole system—I must profess myself to be a humoralist in a considerable degree, although quite ready to recognise the direct as well as the indirect influence of the digestive organs and nervous system in disease."

Upon the immediate influence of the nervous system in modifying the process of inflammation, I have but little to observe. Amongst soldiers and seamen, the class of individuals to whom my observations chiefly refer, we may in general expect these nervous dispositions to exercise a less extensive influence over the process of inflammation and other

morbid phenomena than is to be observed in the promiscuous range of private practice. The nervous system is in some persons extremely irritable, and this irritability, while it is generally the result of disordered health, again becomes a cause of disorder in its turn. Indeed, it may be observed of all the three systems to which I have just adverted—the alimentary, the vascular, and the nervous—that they mutually act and react on each other in such a manner as to render it often exceedingly difficult, if not impossible, to specify the extent to which each of them operates individually in modifying the phenomena of local disease.

The local causes which give rise to inflammation have been subdivided into those of a mechanical and those of a chemical nature. Amongst the former are to be reckoned wounds of all descriptions, contusions, fractures, and even simple pressure. The effect of this last is often manifested in a way highly annoying to the surgeon, as in those cases of accident or disease which necessarily confine a patient for a length of time to one position, and where those points upon which the weight of the body rests become in the first instance inflamed, and subsequently ulcerate, or mortify. Those mechanical causes of inflammation to which soldiers and seamen are more particularly exposed, are incised, punctured, lacerated, and contused wounds; the presence of foreign bodies, forcibly introduced and lodged in different parts of the system, as balls, splinters of shells, or of gun-carriages, &c. There are many other substances capable of exciting inflammation in those places to which they are applied, without any obvious mechanical operation, and these constitute the class of chemical causes. Amongst these may be enumerated extremes of temperature, both as to heat and cold, concentrated acids, acrid vegetable and animal poisons, blisters, and rubefacients. Those from which the soldier is more particularly liable to suffer, are the intense heat of the sun in some climates, and explosions of gunpowder—a cause which often acts both chemically and mechanically. We may also mention a cause the very reverse of these in its nature, but in some circumstances equally certain in its effects—I mean the application of cold.

Our springs in this country, noted for their frequent

changes of temperature, are well known to be peculiarly productive of inflammatory attacks of the mucous membranes of the nose, the fauces, and the bronchiæ, while climates remarkable either for extremes of heat or of cold, are equally productive of diseases which frequently render the soldier incapable of those exertions required of him, or even deprive him of life. In India, we see him falling a victim to inflammation of the liver; and in the rigour of a Canadian winter, often disabled by frost-bite. I may observe, in general terms, that inflammation is apt to occur, and its symptoms to run high, in proportion to the youth and vigour of the subject affected with it; and hence we see how naturally it occurs as a consequence of those injuries to which soldiers are exposed, when inflicted upon men with constitutions such as they generally possess —men in the vigour of life—men enjoying, for the most part, abundance of nutritious diet—and men whose habits are not unfrequently rendered irritable or inflammatory by the use of intoxicating liquors.

In speaking of constitution as modifying the nature and results of inflammation, I may here notice what has been termed the scrofulous diathesis, a state of the system which, wherever it exists, gives a peculiar chronic character to every inflammatory disease, rendering it less painful in its attack, slower in its progress, and more difficult of cure; but upon this state of the system I do not consider this the proper place to enlarge. The instructions for the inspection of recruits direct that every individual bearing marks of scrofula should be rejected from the service; and with these instructions every surgeon who values his own comfort and credit will find it his best policy, as well as his bounden duty, to comply. It is therefore with a view of preventing the admission of such individuals into the service that I here enumerate the more prominent marks which have been considered as characterising the scrofulous diathesis. These are, a complexion remarkably fair, with florid cheeks; thickness and swelling of the upper lip and septum nasi; the eyelids are occasionally affected with a peculiar tenderness and irritability, easily passing into a state of inflammation; the skin thin, delicate, and white; the hair also is, for the most part, fair or reddish, and the belly often tumid.

Inflammation, like almost every other affection to which we are liable, exhibits great variety in its nature and intensity; it differs indeed in almost every individual instance, from the nature of the part affected, from the age and constitution of the patient, or from the external circumstances of climate or of season; and the symptoms, both constitutional and local, vary also in the progress of the same inflammatory attack. We find inflammation in some instances hurrying on rapidly to one or other of those terminations about to be described, while in other cases its progress is slow, and attended with comparatively little constitutional excitement, thus giving rise to a very common division of inflammations into Acute and Chronic—a division, however, entirely relative, and marked chiefly in the one case by the acuteness of the pain and severity of the constitutional symptoms; and in the other by a comparative exemption from pain and absence of symptomatic fever. This has given rise to another division of inflammations into Active and Passive, the former corresponding to the acute, and the latter to the chronic. It is impossible, however, to assign any accurate limits to these different divisions. And although it is of much consequence, in the application of our curative means, to attend to the character of the inflammation, we find the states of active and passive inflammation so insensibly gliding into each other, that it becomes a difficult question in practice to ascertain the proper period for laying aside the remedies suited to the one state, and adopting those suited to the other. Every inflammatory disease has, in fact, its paroxysms of aggravation and remission, which give it at one time the character of an active, and at another that of a passive inflammation.

Various other classifications of inflammation have been proposed, and of these none has more generally or more deservedly attracted attention than that in which inflammations are arranged according to the elementary tissues in which they occur. Of inflammation, as affecting different textures, we may remark, that while the inflammatory affections of the skin have all something in common, which has been characterised by the term erysipelatous, there is no texture in the system in which we find such an endless

variety of diseases, bearing in a greater or less degree the common characters of inflammation, redness, heat, pain, and swelling.

Erysipelas, or inflammation of the skin, presents considerable variety in appearance and intensity, but there are two forms of it which more particularly demand attention. In the one, the disease is confined to the exterior surface of the skin, is of a superficial, transitory, and erratic form, often declining in one place, and attacking another; in the other, the inflammation is more fixed and circumscribed, the whole substance of the skin being affected; the cuticle on its surface is sometimes elevated into vesicles, while the cellular membrane beneath becomes deeply involved, and loaded with serous effusion, forming what is termed Œdematous Erysipelas, at other times becoming the seat of extensive purulent depositions and sloughs, constituting the Phlegmonoid Erysipelas. In both forms of the disease, the erratic and the phlegmonoid, the fever preceding or accompanying the attack is very often of the kind termed by the French, Gastro-enteritic, attended with great irritability of the stomach and alimentary canal. At its commencement, it is often of a very acute and inflammatory nature, but is extremely apt to degenerate into typhus.

From the extensive prevalence of erysipelas in hospitals, it has sometimes been looked upon as of a contagious nature. It is, at any rate, obviously epidemic at particular seasons, and at particular periods of the year, and is very liable to supervene upon wounds and open sores. From the ravages which it has occasionally committed in the Royal Infirmary here, I was at one time greatly inclined to look upon it as connected with circumstances in the locality and construction of the building, and the uncleanly habits of many of our patients in this country. Subsequent observation, however, has made me inclined to attribute less to these local peculiarities, and more to general atmospheric causes. During the summer of 1832, for instance, although erysipelas was not so prevalent in the Royal Infirmary as upon some former occasions, yet I saw much more of it, both in private practice and in the Military Hospitals, than upon any former occasion. Several soldiers died of it within that year, both in the cavalry and infantry barracks; and the Queen's Bays, stationed at Piershill, lost two officers within a

few months, from erysipelas supervening upon slight local injuries.

In proceeding to consider the inflammatory affections of the other tissues, it may be observed, that the cellular membrane lying immediately under the skin, occupying also the interstices of the muscular fibres, and enveloping every vessel and nerve, is one of the most common seats of inflammation, to which, when it occurs in this particular texture, the term Phlegmon has been applied; and from the appearances, progress, and terminations of which, the descriptions of inflammation adopted by most systematic writers have been chiefly borrowed.

All the other membranes as well as the cellular are liable to inflammatory attacks, which, besides exhibiting the common symptoms of inflammation, modify, alter, or destroy the natural secretions and functions of these membranes. On the first occurrence of inflammation in mucous membranes, the secretion from their surfaces is often for a time suspended, and this is succeeded by an increased formation of a thin acrimonious humour, or of a fluid bearing the character of pus; and it seems to be a wise provision of nature that mucous membranes in the inflamed state show no disposition to adhere—an event which, by closing up the different canals to which they afford a lining, would inevitably be attended, in many cases, with a fatal event.

The serous membranes which line the three great cavities of the body, and which also afford an envelope or coat to the viscera which these cavities contain, are extremely susceptible of inflammation, the presence of which is ascertained by the severe and lancinating pain with which it is accompanied, and by the existence of symptomatic fever. In a state of inflammation these membranes are found to afford a copious effusion of serous fluid, sometimes of pus, frequently of sero-purulent matter, and very often of coagulable lymph; the effusion of the latter giving rise to those adhesions which are so common a result of inflammatory attacks of the pleura or peritoneum.

The capsular ligaments and cartilages of joints, the sheaths of tendons, the bursæ mucosæ—in short, what are termed synovial membranes, are less susceptible of inflammation than the class of serous membranes. But as the synovial membranes

are liable to inflame from those external injuries to which soldiers and sailors are peculiarly liable, I mean from wounds and contusions of the joints, they demand much attention from the military surgeon. The constitutional symptoms are extremely difficult to control, and require the use of the most powerful antiphlogistic remedies. In cases where the inflammation of these membranes arises spontaneously, or at least without any obvious cause, the constitutional symptoms are more mild in the incipient stage, but frequently, after a long continuance, assume the form of an irremediable hectic.

Inflammation of the periosteum, of the aponeuroses of muscles, of tendons, and of ligaments, which, in a sound state, are endowed with little sensibility, is characterised generally by an exquisite degree of pain, and often by a high degree of constitutional excitement. The inflammation of these parts is not liable to terminate in suppuration, but it frequently ends in a thickening of the membrane, more or less permanent.

Bones, the most solid and compact parts of our system, are susceptible of inflammation from many causes which the military and naval surgeon has abundant opportunities of witnessing; and although the progress of inflammation is often slow and protracted in this texture, it still exhibits those phenomena by which it is characterised in other tissues. The death or mortification of bone, termed necrosis, with the separation of the dead parts from the living, is a process of a very remarkable nature, and requires often a great length of time for its completion. The constitutional symptoms attending this process vary exceedingly in severity; and where the disease is extensive, often assume the form of hectic fever.

The muscular fibres, the nerves, the blood-vessels, both arteries and veins, and the lymphatic vessels, are all structures susceptible of inflammation, and affording peculiarities which we shall have other opportunities of noticing. It may be remarked that the liability of different textures to inflame is, generally speaking, proportioned to the number of capillary vessels which they contain, and to the nerves which they receive; the skin, the mucous, the cellular, and serous membranes, and the parenchymatous substance of the internal organs, are the textures most susceptible of this affection; while some portions of the structure, such as the epidermis,

the nails, and hair, seem altogether unsusceptible of this process.

Inflammation has long been looked upon as terminating in *Resolution*, *Suppuration*, and *Gangrene*, or *Mortification;* but more recent and accurate observation has led to a subdivision of these, or at least of the two latter; and we now speak of several other processes, such as adhesion, effusion, ulceration, granulation, &c., as the results or concomitants of inflammatory action.

Resolution is in general the most desirable termination; and when complete, the symptoms, both constitutional and local, gradually decline, the increased action of the vessels subsides, and without any considerable or obvious evacuation, the inflamed part gradually resumes its natural state and its proper functions. This is, in fact, the spontaneous cure of inflammation; and while it is sometimes altogether the work of nature, it may at the same time be greatly promoted by art.

Effusion is sometimes a result of inflammation, and in such cases the fluid naturally poured out by the exhalant vessels from membranous surfaces, is separated in a superabundant quantity, giving rise to hydrocephalus in the head, hydrothorax in the chest, ascites in the abdomen, and anasarca in the limbs; in which latter case the fluid occupies the cellular membrane.

Adhesion is another result of inflammation, and one of great importance to the surgeon; it is to this process to which we look for the cure of many formidable wounds; it is upon this process we depend for reunion of the parts after the removal of morbid excrescences, and after the amputation of limbs. Although in a great proportion of cases, it is our purpose to promote this as a salutary process, we are sometimes called upon to obviate the consequences of preternatural adhesion, as producing hideous deformities, as impeding the motions of limbs, or interrupting the salutary functions of organs. Union by adhesion, or what has ever since the days of Galen been termed union by the first intention, has been considered under two different conditions. When the part divided by fracture, rupture, laceration, or otherwise, has no communication with the external atmosphere, by means of a

wound in the superincumbent parts; or when the whole of the separated parts are divided by a wound penetrating from without inwards, or *vice versa*, as by a protruding bone, and when of course a communication exists with the external atmosphere.

Of the minute and successive changes which take place in each of these circumstances, an interesting account is given in the writings of Mr. Hunter, who, of all other writers, has been the most instrumental in elucidating the process of adhesion. By this process parts which have been separated by nature, by accident, or by design, are made to unite together, and to form a continuity of living solid. Every thing relating to the process of adhesion is an object of peculiar importance to the military surgeon. "The universal doctrine and practice of procuring adhesion," says Mr. John Bell, "has done more for surgery in a few years, and more especially for the surgery of wounds, than any other general observation, not excepting even the greatest of all discoveries, the circulation of the blood."

As we shall have occasion to advert more particularly to the subject of adhesion when speaking of the reunion of wounds, I content myself for the present with observing, that the steps of the adhesive process, in so far as they are readily conspicuous to our senses, consist, first, in the effusion and intermixture, from the opposite edges of a wound, of what is termed coagulable lymph; the subsequent penetration of this uniting medium by blood-vessels; the complete establishment of a circulation through it, and the consequent reunion of the divided surfaces. For the completion of this process, it seems only necessary that the constitution should be sound and vigorous, that the wound should be free from the presence of any extraneous matter, and that its opposite surfaces should be retained in close contact. We shall hereafter have occasion to enter into a detail of the artificial or auxiliary means by which the establishment of a vital process, so desirable in itself, may be best promoted and secured; and at present I would refer those who are desirous of studying the phenomena attendant upon the process of adhesion, to an "Essay on the Formation of New Blood-Vessels," presented some years ago

to the Royal College of Surgeons here, by my former colleague Dr. Allen Thomson.

Suppuration is said to take place in cases where wounds do not unite by adhesion, and where their surfaces become covered with purulent matter, which appears to be a secretion produced by a peculiar action of the vessels of the part. This process also often takes place in different textures of the body, without the existence of a wound; and when thus included in a shut sac, forms what is termed an abscess. This is perhaps one of the most common of all the results of inflammation. We see pus formed occasionally in all the great cavities of the body, and we see it often, in consequence of chemical or mechanical irritations, formed on the surface of those membranes lining different canals, which in the sound state are covered with a secretion of mucus.

Ulceration is that process by which ulcers are formed, by which abscesses are sometimes opened without the assistance of art, and by which the soft parts are removed so as to make way for the passage of extraneous matters to the surface of the body. This process is also a common result of inflammation, and is essentially performed by the absorbent vessels, which gradually remove a portion of the once living solid.

Granulation is a process to which we look for the restoration, to some extent, of lost parts. The first step in this process, which is obvious to our senses, is the effusion of a layer of coagulable lymph, at first exhibiting a smooth surface, but subsequently becoming elevated into small red papillary eminences, known by the name of granulations; and if a healthy disposition exists, the healing process is completed by the gradual exudation of a tenacious substance, which is subsequently converted into a tegument for the injured part, constituting what is termed cicatrization.

Mortification is likely to be the result of the local affection when none of the preceding terminations occur as a consequence of inflammation, but when the symptoms, particularly the constitutional ones, become aggravated. Its approach is marked by the fiery redness which exists in the commencement of inflammation passing into a dark and livid hue, the sensibility of the part becoming blunted, and the cuticle often rising into blisters; the incipient stage of this process has been

termed Gangrene, in contradistinction to what has more strictly been termed Mortification or Sphacelus; the former appellation, gangrene, is applicable so long as any degree of circulation continues through any of the vessels of the part affected, so long as any degree of warmth remains, and so long as the nerves of the part retain any portion of their sensibility; it is, in short, the intermediate stage between inflammation, which is its precursor, and sphacelus, which is, I may say, always its termination. Gangrene admits also of another subdivision into the inflammatory, humid, or acute, and into the dry, or chronic.

Some recent writers, and particularly Baron Larrey, have also insisted much upon an important division of gangrenes into those from an internal and those from an external cause. Of the former a very remarkable species has been observed, and attributed to the feeding on spoiled or diseased grain, particularly on bad rye. The chief external causes of gangrene are burns, caustics, the presence of ichorous, urinary, or fecal matter in the cellular membrane; and those particularly affecting the soldier are extreme cold, and gunshot wounds. Of the former, many interesting examples are recorded by Baron Larrey in his Russian campaign, and instances of the latter are familiar to every military surgeon, particularly from wounds involving the large arteries and veins of a limb. One form of gangrene seems dependent either upon some infectious principle, or at least upon causes simultaneously affecting numerous individuals—the whole ulcers and wounds in a hospital sometimes becoming affected with what has been termed Hospital or Traumatic Gangrene, a disease to which we shall immediately have occasion more particularly to advert.

During the year 1832, amongst several anomalous events which were observed in practice, some cases occurred of what may be looked upon as idiopathic gangrene, that is, gangrene occurring rapidly without almost any appearance of previous inflammation or inordinate action in the part affected. A soldier of the 90th light infantry, aged forty-seven—melancholic temperament—old appearance—much given to intoxication, and subject to attacks of delirium tremens, was admitted into the regimental hospital in Edinburgh Castle about the middle of November, complaining of sore throat, with dusky

redness and small pustules covering the pharynx; the larynx was also tender upon pressure, with difficult deglutition and considerable febrile excitement. The sore throat was relieved, and the fever abated under the remedies prescribed; but on the fourth day from his admission one of his thighs was observed to be red, and the integuments to have a tense and boggy feel, without any increase of temperature. The patient was observed to have a wild aspect and agitated appearance, and to have been at times delirious, although the febrile symptoms continued moderate. On the following morning he was rational, and now for the first time stated, that he had received a blow upon the thigh while in the guard-house previous to his admission. The thigh was of a dusky red colour, intermixed with yellow streaks, the whole extremity cold, the countenance pale and shrunk, and when I saw him about midday no pulse was perceptible in any part of his extremities. Stimuli of every kind, both internal and external, failed to have any sensible effect, and he died in the evening.

The case of a woman of the same regiment was, in some respects, still more remarkable. She began, while going about her usual occupations in the barrack-room, to complain of some uneasiness in her thigh. Upon examination, it was found swollen and livid, and in less than forty-eight hours she died, without, so far as I could learn, any trace of accident or previous disease. On dissection of the male subject, the sterno-hyoidei muscles were found soft and discoloured, and a collection of purulent matter on the fore-part of the larynx. The affected thighs in both subjects were found to have a swollen and gorged appearance; the cellular membrane loaded with bloody serum, in some parts broken down and gangrenous; the muscles loose in texture, and easily lacerated. In both cases the arteries and veins of the affected limbs were minutely examined, but presented no morbid appearance, nor were any traces of recent disease found in the internal parts. For the particulars of these cases I am indebted to Dr. Robertson, then surgeon of the 90th, and I have been tempted to give this brief notice of them here, because, after fifty years of professional study and experience, the circumstances which they presented are still to me altogether singular.

Having offered these few remarks on the symptoms, causes,

varieties, and terminations of inflammation, I now proceed to point out the means adapted to its cure, or, in other words, the means calculated to promote its termination in resolution. This is, strictly speaking, the only way in which inflammation terminates; and as other opportunities will occur of pointing out the means calculated to promote adhesion, suppuration, &c., I shall for the present confine myself to the detail of the most efficacious means of subduing inflammation, and restoring the vessels of the inflamed part to a healthy mode of action. These means are twofold, Constitutional and Local; and while the treatment of slight or limited cases of inflammation may often be trusted to local applications, wherever the inflammation is acute and its site extended, particularly if any vital organ is involved, we shall find occasion for the most powerful constitutional remedies.

General Blood-letting has been universally admitted to be one of the most powerful remedies in inflammation, whatever view may have been taken by pathologists of its immediate nature or proximate cause. In the employment of this remedy, we must have respect to the violence of the disease, the importance and texture of the organ affected, and to the age and constitution of the patient. One of the veins at the bend of the arm is, for the sake of convenience, generally selected as the spot from which blood is abstracted, and as much experience has taught us that more good is obtained by the abstraction of a smaller quantity of blood in a short space of time, than by withdrawing a larger quantity in a more gradual manner, we are led to the practical rule of making a large orifice in the vein, or, in robust constitutions and violent attacks, to open a vein in each arm. The early employment, too, of general bleeding is one of the most certain means of promoting its efficacy, and when we are satisfied of its necessity, we cannot be too early in having recourse to it. As to the quantity necessary to be taken away, we ought to be regulated more by the impression which the bleeding makes on the disease, or on the system at large, than by any preconceived notions as to the particular quantity, measured by pounds or ounces. The occurrence of syncope, an event much dreaded by the patient, is one which the surgeon frequently looks forward to as the only thing which ought to limit the extent of the bleeding. This

redness and small pustules covering the pharynx; the larynx was also tender upon pressure, with difficult deglutition and considerable febrile excitement. The sore throat was relieved, and the fever abated under the remedies prescribed; but on the fourth day from his admission one of his thighs was observed to be red, and the integuments to have a tense and boggy feel, without any increase of temperature. The patient was observed to have a wild aspect and agitated appearance, and to have been at times delirious, although the febrile symptoms continued moderate. On the following morning he was rational, and now for the first time stated, that he had received a blow upon the thigh while in the guard-house previous to his admission. The thigh was of a dusky red colour, intermixed with yellow streaks, the whole extremity cold, the countenance pale and shrunk, and when I saw him about midday no pulse was perceptible in any part of his extremities. Stimuli of every kind, both internal and external, failed to have any sensible effect, and he died in the evening.

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Having offered these few remarks on the symptoms, causes,

of the disease chiefly by the severity of the pain, I have no hesitation in saying, that the aggravation or decrease of pain is a much less equivocal symptom than the state of the pulse. With reference particularly to inflammations of the abdominal viscera, it is now many years since I remarked, that in those inflammatory affections of the bowels so prevalent amongst the European soldiers in India, the state of the pulse is not a safe criterion either in forming a prognosis or in regulating the treatment.

I am further of opinion, and I may take this early opportunity of expressing it, that too much stress has been laid upon the state of the pulse, and too much refinement has been introduced into medical writings upon this subject. When we see the pulses of different individuals so various in a state of health, how can we look for anything like uniformity in a state of disease? "It is not quickness of the pulse alone which indicates bleeding, for a quick pulse is often a proof of irritability, which bleeding will increase. The indication of general bleeding is a hard pulse, when the action is strong, each pulsation feeling like the vibration of a wire." But although the quickness of the pulse can be accurately measured, the other circumstances connected with it are not always easily ascertained. "The knowledge," says Mr. Hunter, "of the soft, the hard, and the thrill, are such as can only be acquired with accuracy by the habit of feeling pulses in these different states, and by many is not to be attained. The late Dr. Hunter was a striking instance of this; for though he was extremely accurate in most things, he could never feel that nice distinction in the pulse that others did, and was ready to suspect more nicety of discrimination than can really be found." The buffy coat of the blood, when it exists in conjunction with other symptoms of inflammation, is an additional evidence that disease is present; yet it may be remarked of this as of the pulse, that it is a symptom which ought not of itself entirely to regulate our practice; while the presence of a buffy coat on the surface of the blood may encourage us to repeat venesection, its absence ought not to be an absolute bar to a further extension of this practice.

Purgatives form one of our most powerful constitutional

remedies in the treatment of inflammatory diseases, and are applicable to almost every form of these affections, with the exception perhaps of enteritis or inflammation of the intestine itself, in which the employment of strong or repeated purgatives is at least questionable practice. By the increased discharges which they occasion from the secreting surface of the bowels, they produce an evacuation highly favourable to the cure of inflammation, or to its termination in resolution. A deficiency of secretion from the alimentary canal is the cause of a great number of the diseases to which we are liable, as may be learned from an attentive study of Dr. Hamilton's work on purgatives, to which I have already had occasion to refer. The internal surface of the intestinal canal is a secreting as well as an absorbent surface; and of the importance of keeping up the action of this surface, we may form some idea from the following estimate of its extent, which is given in Sir Astley Cooper's Lectures:—"The internal surface of the intestines is lined by glands; the tube itself is on an average twenty-seven feet in length, and three inches at least in circumference; so that there are here near one thousand inches of surface from which in health continual secretion proceeds. What then," says Sir Astley, "must be the result of allowing so extensive a secreting surface to remain inactive? the production and continuance of constitutional irritation."

Purgatives produce the most beneficial effects in inflammation, by exciting the intestines, producing a determination of blood to them, and abstracting it from the part inflamed, upon the acknowledged principle, that two increased actions of any extent are not easily maintained in two different parts of the body at the same time. In addition to the increased secretion from the bowels, it is of much consequence also to promote the action of the liver; and with this view mercurial purgatives are often given with great advantage. It is a common and highly useful practice to exhibit mercurials at night, and to follow them with saline purgatives in the morning. Saline purges alone are also greatly conducive to the cure of inflammation. They should always be taken largely diluted; in small doses frequently repeated, their beneficial operation is prolonged; and they produce in this way another good effect which has not been sufficiently adverted to—they

excite in the patient a greater or less degree of thirst, which leading, as it should do, to the employment of diluent drinks, promotes their beneficial operation.

Diaphoretics are another important means of moderating the symptomatic fever attendant upon inflammatory complaints; and from the extensive surface upon which they operate, producing often a copious discharge from the whole skin, we may easily understand the beneficial effects with which they are attended. In the selection of medicines of this class, those containing opium are avoided by some practitioners, from an apprehension that this medicine will, by increasing the action of the heart and arteries, have an injurious effect upon the local disease; and this it certainly will have, if the sudorific fails in producing a copious perspiration; but when this desirable result is procured, it will more than compensate for any temporary excitement of the circulating system from the opium. Much experience in the employment of the common Dover's powder, and of antimonial wine combined with laudanum, has given me confidence in the use of these remedies, and has led me to have less dread of the stimulating effects of opium than what is sometimes entertained. But while I thus attempt to obviate an objection to the use of opiate sudorifics, I must not overlook an important advantage attending another set of remedies of this class—the antimonial diaphoretics, which, by producing nausea, and reducing the frequency and force of the pulse, as well as by opening the exhaling vessels on the surface of the body, have a most salutary effect in inflammatory diseases.

The Warm Bath is analogous in its operation to sudorifics, and indeed a practice often leading to a copious diaphoresis. It is a remedy always highly grateful, and, when properly regulated, often attended with the most beneficial effects. The temperature of the bath should be made agreeable to the feelings of the patient, and in most cases this will be about 90 or 95 degrees. If it does not become necessary to remove the patient from the bath, in consequence of a tendency to faint, the use of this remedy ought to be prolonged farther than what it generally is in this country. A quarter of an hour, or twenty minutes is, perhaps, the shortest period in which the warm bath can be expected to produce its good

effects: and this may often be prolonged even to a whole hour with advantage. A partial use of this remedy in the form of Pediluvium or Semicupium, by procuring an increased determination of blood to those parts to which it is applied, often produces a beneficial effect on distant parts of the body when affected with inflammation. It may not be altogether out of place here to remark, that a general and very prevalent error in this country is, to take too much of the cold and too little of the warm bath—to stay too long in the one and too short a time in the other.

In entering upon the consideration of the Topical means for the treatment of inflammation, I scarcely consider it necessary to advert to the removal of those exciting causes of the disease which sometimes exist in the shape of extraneous bodies, such as splinters, &c., forcibly intruded into the different textures. This preliminary step is so congenial to the dictates of common sense, that the surgeon will frequently find it executed by the patient or the bystanders, when its removal does not imply the necessity of any particular art or dexterity for its accomplishment.

Topical blood-letting is, of all the local remedies, perhaps one of the most generally applicable, and, whenever properly applied, one of the most effectual. In extensive phlegmonous inflammation, local blood-letting is hardly ever improper. Were I to specify particularly the cases in which it was more peculiarly appropriate, I should include most of those inflammations supervening upon external injury; and to these I should add, amongst the diseases more peculiarly incident to soldiers, ophthalmia, hernia humoralis, and glandular swellings in the groin or elsewhere. In inflammations of the joints, whether entirely attributable to mechanical injury, or complicated with a constitutional cause, local blood-letting is eminently serviceable. In cases of internal inflammation of the great cavities, unless where the pain is much circumscribed or confined to one spot, local bleeding is not to be trusted to. In erysipelatous inflammations, or those seated in the cutaneous texture, the propriety of local bleeding by leeches or the scarificator has by some been looked upon as inadmissible, the punctures being liable to inflame and fester, sometimes

even to mortify, and this more particularly in peculiar habits and in peculiar situations and seasons.

In the treatment of phlegmonoid erysipelas, practices calculated to draw blood from the affected part, and at the same time to relieve more or less the tension of the skin, have of late been introduced and strenuously advocated. Repeated punctures with a lancet over the erysipelatous surface are recommended by Sir Richard Dobson; numerous short incisions through the inflamed skin are recommended by Mr. Copland Hutchison; and longer incisions, to the extent of several inches, by Mr. Guthrie and Mr. Lawrence. The punctures are sometimes advantageously employed in erysipelas of the face, and are calculated to relieve the over-distended vessels, and to obviate serous infiltration. The other two practices are beneficial, not only by the evacuation of blood and relief of tension, in the first instance, but by facilitating the escape of pus and of sloughs from the cellular membrane, should these ultimately form. A considerable experience of all these three practices leads me to give the preference to the modification recommended by Mr. Hutchison, from a persuasion that we can by it most effectually accomplish all the objects above stated. The skin is seldom so equally and uniformly tense over an inflamed limb as to enable us to relieve it so well by one long incision as by numerous short ones judiciously placed. And here I may remark, that while forty years ago our practice in erysipelas was quite nugatory, inert, and futile, there was at a later period some risk of our running into the opposite extreme. One can scarcely conceive a whole limb so severely and uniformly affected, as to justify or to demand the practice noticed, I think, by the late Mr. Earle, in which the surgeon of a provincial infirmary made an incision from the trochanter major down to the malleolus externus.

The impossibility of reconciling every useful practice with a preconceived theory, is in no instance more strikingly exemplified than in the local applications which are of service in inflammation. The proof of this is, that these applications admit of one very broad division into *cold* and *warm;* and although a great proportion of cases receive most relief from the use of cold, sedative, astringent lotions, there are con-

stitutions and parts which derive most benefit from the local employment of warm emollient remedies. Of the local remedies applied directly to inflamed parts, *Cold* is undoubtedly one of the most powerful, and, from the facility of its adoption, it is peculiarly valuable to the military surgeon. In reducing the temperature, cold diminishes the morbid sensibility and pain of inflamed parts, and restrains the inordinate action of the vessels by which these parts are supplied with blood. A common method of employing cold is by applying to the inflamed part cloths which have been dipped in cold water; and along with the cold water used for this purpose, it is customary to blend remedies of an astringent and sedative nature. The use of the acetate of lead in this way is a practice sanctioned by very extensive experience. M. Goulard, an enthusiastic French writer in favour of lead, has represented it as almost equally applicable to all stages of inflammation, to suppuration, and even to gangrene; but, although this writer's zeal has evidently carried him too far, experience and observation teach us, that while there is a chance of procuring resolution, no local applications to phlegmonous inflammation can be more proper than cold solutions of the acetate of lead. Besides this salt, the sulphate of zinc, the muriate of ammonia, vinegar, and alcohol, are common additions to the cold water applied to inflamed surfaces. All these, however, seem to possess less of a specific effect than the acetate of lead; and in using them instead of this last-mentioned remedy, or in using one of them in preference to another, we are more guided by circumstances than by any acknowledged superiority in the respective powers of these remedies. Solutions of the muriate and also of the acetate of ammonia have been thought more particularly applicable to swellings of a chronic or passive character; and while in the earlier or more active stages of such swellings they are applied cold, they become, in the progress of the affection, more beneficial by being used warm.

Warmth and moisture combined are often found a powerful means of combating internal or deep-seated inflammation. Inflammation of the intestines, urinary bladder, and other abdominal viscera, have been specified as cases in which the good effects of warm applications are generally conspicuous.

In such cases, they may either be applied to the surface in the way of fomentation, or bath, or they may be thrown into the bowels in the form of injections. In preparing water for the purpose of fomentations, it is customary to boil in it poppy-heads, chamomile flowers, or other anodyne and emollient ingredients; but how far these are useful is not distinctly ascertained, and many practitioners believe that warm water alone is as efficacious as decoctions of particular herbs.

While fomentations are only to be considered as a temporary or occasional expedient, a more permanent form of emollient applications is used in the shape of cataplasms, which, to insure their full effect, should be frequently renewed, as they soon loose the degree of heat upon which their efficacy so much depends. It is, however, to the advanced stage of inflammation, when its termination in suppuration becomes inevitable, that cataplasms are more peculiarly appropriate. Various saline substances, such as common salt, muriate and acetate of ammonia, &c., are sometimes added to warm fomentations, as well as to cold lotions, for the purpose of being applied to inflammatory affections; and these warm discutient applications are more particularly applicable to some affections of the joints of an indolent character.

Of the particular inflammations likely to be most benefited by the use of cold or of hot applications, it is difficult to speak with precision. To inflammatory affections of the extremities, we apply cold lotions freely, and often with the best effects; in inflammations seated on the head or trunk, there is a necessity for caution in the use of cold applications, which may be followed by a transference of the inflammation from the surface of the body to the membranes of the brain, the pleura, or peritonæum. The earliest stages of acute ophthalmia, and hernia humoralis, have been specified as cases in which, generally speaking, warm applications are preferable to cold ones; and in this sentiment my own experience induces me in a great degree to coincide. Mr. James has pointed out the propriety of adverting to the cause, or at least to the concomitant circumstances of the case, in deciding upon the nature of the applications to be used. Thus, in mumps and rheumatism, the constitution is chiefly to be attended to, and cold applications are certainly improper. In inflammation of the

testis, proceeding from a blow, after leeches have been frequently employed, he considers warm fomentations most useful, but does not think this practice equally effectual in many cases of hernia humoralis from gonorrhœa, in which he prefers the cold lotion. In swelled testicle I have long been accustomed to use the cold and warm applications alternately, at intervals of some days, and when the disease did not appear to be yielding to the one, to have recourse to the other.

In carrying this plan into effect, peculiar idiosyncrasies are occasionally met with, as in the following case :—A young gentleman whose testicle had been considerably swollen from gonorrhœa, had it reduced by leeches and warm fomentations to nearly its natural size, and was then induced, by my advice, to employ a cold solution of the acetate of lead. This was however in the course of the ensuing night followed by a return of the swelling, and a very severe attack of sciatica; the swelling of his testicle was again reduced by leeching and fomenting, and the sciatica disappeared. Being exceedingly impatient to get rid of his complaints, on purpose to get away to the country, he was, after a considerable lapse of time, induced to renew the astringent application, in hopes of expediting his cure, but the sciatica returned with excruciating severity, and the testicle again inflamed so much as to threaten suppuration—an event which was only averted by the employment of general blood-letting, antimonials, warm baths, purgatives, and fomentations. He then told me that his father had long been a martyr to rheumatism, and that many of his family had also suffered from it—circumstances which induced him to conceive that he inherited a peculiarity of constitution.

Such occurrences show how little we can judge, *a priori*, of the benefits likely to accrue from the employment of any given remedy in any given case; and while the impossibility of being more precise upon this point is much to be regretted, the feelings of the patient should always be consulted; "for if the pain be materially alleviated by this or by that application, its employment will hardly ever be wrong."

The only remaining topic connected with the treatment of inflammation to which I think it necessary to advert, is

the nature of the diet and regimen ; and upon this point no difference of opinion exists. Every scientific surgeon admits that in acute inflammation, while a cure by resolution is practicable, and while this is the object of our treatment, the patient's diet can scarcely be too abstemious ; his abstinence from vinous or spiritous liquors cannot be too rigid ; the body, and particularly the affected part, cannot be kept too much at rest, nor the mind too tranquil.

BURNS.

The inflammatory action succeeding to burns is the chief object of attention in conducting their medical treatment, and hence their consideration appears to me to be appropriately introduced as a sequel to the subject of inflammation. The accidents of this kind to which I would more particularly advert, as incident to soldiers and seamen, occur perhaps less frequently from the fire of an enemy than from accidental explosions of gunpowder, originating often from ignorance or inattention. The bursting of fire-arms, the explosion of cartridge-boxes, the blowing up of tumbrils, magazines, and batteries, are amongst the most common sources of burning in military life, and in such cases the burns are frequently accompanied with lacerated and contused wounds, so formidable as to render the burn a secondary object.

To give an idea of the nature of such accidents, I may refer to some cases noticed in the account of the explosion of the Amphion at Plymouth in 1796, and to a case detailed in Trotter's Medicina Nautica, of a seaman belonging to the Circe, who, by the explosion of a gun in the act of reloading, was blown into the main chains, and was there found with his face, head, and breast scorched in the most shocking manner, part of both arms carried away, and the right arm fractured near the axilla—notwithstanding which this individual was saved. But one of the most frightful pictures of this description is that recorded by Baron Larrey in the first volume of his Memoirs, where he gives an account of the ex-

plosion of some redoubts blown up by the enemy at the moment when the French soldiers had entered them. "More than a hundred of our men were in the fortifications at the moment when the mines were sprung. They were raised along with the debris of the batteries, and the pieces of artillery which defended them. The fragments of this artillery, the stones, the men, or pieces of them, were scattered *pêle-mêle* by the explosion, and fell here and there from a height more or less considerable. Many of the victims of this frightful catastrophe had already ceased to exist at the moment of ascension; others met with their death on falling upon the rocks. Some were mutilated of one or more members, others were burned over the whole surface of the body, or in the principal regions; some, with whom the commotion had been violent, or in whom the burn extended to the viscera of the lower belly, died a few hours after their entrance into the ambulance. I was obliged to amputate both the thighs of one of the soldiers who survived this disaster. Besides the sphacelus of the two limbs, produced by the total disorganization of the parts, he had the face, the breast, and the hands burnt; but notwithstanding the loss of his two extremities, and the enormous burnings with which he was covered, this brave soldier was saved and completely cured." In such cases as these, the constitutional treatment adapted to the more severe injury is equally appropriate to the lesser; and from the multifarious local remedies which have been recommended for the cure of burns, we are to select those best suited to the complicated nature of the accident.

Burns have been divided by systematic writers into three different classes or degrees; those which merely produce a superficial redness and inflammation on the surface, terminating in resolution, and healing without the detachment of the cuticle,—those which affect the vitality of the cutis, accompanied with the elevation of the cuticle into vesicles or blisters, and producing suppuration on the surface of the true skin,—and thirdly, those where the whole thickness of the skin, and even the subjacent parts, are affected by the injury, leading to the formation of a slough or eschar, which must necessarily be detached before a cure can be accomplished. These subdivisions have been carried much farther by some writers

particularly the French, and in the last edition of Sabattier's "Médecine Operatoire," published under the inspection of Dupuytren, no fewer than six divisions or degrees of burns are pointed out; but this minute subdivision of disease is more calculated to distract the surgeon's attention than to benefit the patient. Where a difference in the symptoms of a disease, or in the nature of an injury, leads to the employment of a different line of practice, let it by all means be noted, and on every occasion attended to; but to change our prescriptions for every minute shade in the appearance of disease would be equally impossible and equally futile as to change them for every variety in the complexion or in the features of the human face. It is obvious that all the three degrees of burning above noticed may, and very often do, result from the same accident. Indeed it is perhaps only the first degree of burning which can exist alone, for the occurrence of the greater mischief necessarily implies the precedence or simultaneous existence of the less; the second is often accompanied by the occurrence of the first contiguous to it; and the third by the occurrence of the two former degrees in the parts adjacent.

It is however altogether unnecessary for our purpose to enter farther into the classification of burns, more particularly as this has obviously been founded upon the appearances to be seen in those burns, originating from the common accidents of civil life, from the contact of boiling liquids, or the combustion of the patient's clothing. In all cases the pain of burns is exceedingly acute, and perhaps more so in those cases where it is confined to the surface of the skin than where the texture of this is completely destroyed. Where the burnt surface is extensive, the accident is not unfrequently attended with convulsions, and in them the patient sometimes expires. The dangerous symptoms which proceed from the extent of a superficial burn or scald in one instance, may equally result in another from an injury more circumscribed but penetrating deeper; so that in all cases, in estimating the danger from burns, attention must be paid both to their extent superficially, and to the depth to which they may have affected the subjacent textures—circumstances which are greatly influenced by the nature of the burning body, and the length of time it

may have remained in contact with the skin. Thus it has been observed that scalds occasioned by boiling liquids are more or less severe, according to the various capacities of these liquids for caloric; and burns from metallic bodies, when the period of contact has been the same, are proportioned to the heat of the metal. The danger is also dependent upon the age and constitution of the patient, and on the seat of the injury. Such accidents are generally considered more dangerous in cachectic habits, in childhood and advanced years, than in hale constitutions and in the prime of life; more dangerous when seated about the head or trunk, than when affecting the extremities.

When burns are occasioned by the contact of hot fluids, the first phenomena which present themselves are, redness of the skin and pungent pain in the burned part; to which succeed vesication, in consequence of a serous effusion under the cuticle, and a slight degree of swelling. The appearance and extent of the vesication is greatly influenced by the natural thickness of the cuticle in different parts of the body, and the facility with which it is detached from the subjacent texture. Thus vesications in the palms of the hands and soles of the feet, where the cuticle is thick and firmly adherent, are less extensive, and slower in making their appearance, than in other parts of the body. These local phenomena, when of limited extent, and confined to the extreme parts of the limbs, are often unattended with any constitutional symptoms whatever, and where the cuticle has not been elevated, sometimes disappear in a few hours. When a vesication has once occurred, the period of complete restoration must necessarily be protracted, in order to give time for the formation of a new cuticle, which, in slight cases may, by proper management, be greatly forwarded previous to the detachment of the old.

In burns from gunpowder, it is to be observed that, from the momentary application of the cause, the injury is often of a superficial kind, unless in those cases where, from the close contact or large quantity of the powder, or from the accidental combustion of the patient's clothing, the parts become extensively and deeply involved. In many of the injuries originating from explosions of gunpowder, the hands

and face are more particularly affected, and here the structure of the parts, as well as the nature of the accident, contribute to limit the number and extent of the vesications. The surface is blackened; the eyelashes, eyebrows, whiskers, and whatever hairs may be contiguous to the affected part, are singed or entirely destroyed; grains of gunpowder are found lodged in the skin, some of them partially, and others completely buried in it. When this has taken place an indelible mark remains after the cure, not exclusively, as some have supposed, from each distinct granule of the powder remaining entire and enclosed in a minute capsule; but rather, I believe, from the granules being decomposed and partially discharged or absorbed while the carbonaceous or colouring matter remains in the skin, as in those letters or emblematic figures which we often see artificially imprinted on the arms of soldiers and seamen, by pricking out the figure with a needle and inserting a little gunpowder or China ink into the skin —a mode of marking deserters which is enjoined by the articles of war.

In extensive burns even of a superficial kind, constitutional symptoms of a very alarming nature follow the local injury. For several hours after the receipt of a severe burn, the leading symptoms indicate a general collapse of the powers of the system. Faintness, vomiting, chilliness and shivering, with a feeble, unequal, irregular, or intermitting pulse, and oppressed breathing, are the most conspicuous symptoms, while in some cases convulsions occur; and if in this state the patient expires, he sinks from causes which we cannot distinctly explain. We can only refer his death to a general shock of the nervous system, which, as in many other injuries, speedily overpowers the patient, and leaves no particular morbid appearance in the internal parts. In such cases perhaps the most powerful remedies would not be of any avail, but, in so far as we can expect them to be useful, cordials and opiates are obviously indicated. When a patient survives for four-and-twenty or eight-and-forty hours, reaction more or less vigorous commences, attended with a quick and for the most part small pulse, heat of skin, and urgent thirst; the shiverings still recurring at irregular intervals. In this state of symptomatic fever the patient may

be carried off at any time previous to the tenth or twelfth day, and the phenomena observed on dissection will be those usually exhibited in other cases of fever, internal congestion sometimes terminating in effusion in one or all of the great cavities.

In such cases the head is sometimes the principal seat of congestion. Dr. Gulland of the navy mentioned to me that, upon one occasion, he had the treatment of twenty-five men who were injured by the explosion of powder in a gun-boat, seven of whom died delirious, and all of them had effusion and plethora of the vessels of the brain. More frequently, however, the thorax is said to be the seat of the interior engorgement. How far this is countenanced by dissection, my own observations do not enable me to state distinctly; but the sympathy existing between the skin and the lungs, from their both being exhalant surfaces, the additional load thrown upon the latter by the cessation of the functions of the skin over a large surface, and the great dyspnœa which often exists during the life of the patient, all appear to me circumstances which render it highly probable that the lungs are the organs most likely to suffer. Some of the French writers, full of the gastro-enteritic doctrine, attribute the patient's death in such cases to inflammation of the internal surfaces of the abdominal viscera, and many observations recently made in this country, in which congestion, inflammation, hæmorrhage, and ulceration have been observed in the upper part of the intestinal canal particularly in the duodenum, by Mr. Samuel Cooper, Mr. Curling, and others, tend to confirm this view of the matter. But from whichever of these sources the danger may be apprehended, the indications in the acute stage of the symptomatic fever are the same—the exhibition of mild evacuants, laxatives, diaphoretics, and opiates, with the employment of blood-letting, whenever the severity of the symptoms requires it, or the vigour of the patient's constitution admits of such a means of cure.

After the lapse of ten or fifteen days the severity of the febrile symptoms generally abates, and in favourable cases, a progressive amendment goes on; but in severe cases a temporary diminution of the febrile action, about the period just specified, does not always indicate an exemption from danger;

for the febrile action is liable to recur, and the patient may be carried off by such recurrence at any time from three to six weeks after the injury. When death occurs after this period, the patient for the most part sinks in a hectic state, exhausted by a profuse discharge of matter from an extensive suppurating surface. Here the indications are, to support the sinking powers by nutritious diet, by the exhibition of porter and wine; to obviate diarrhœa by opiates, and profuse sweatings by mineral acids.

To recapitulate, then, the leading indications for the internal treatment of severe burns; the exquisite pain, the constitutional shock, and nervous agitation, immediately succeeding the accident, and which endure sometimes for a period of forty-eight hours, are best obviated by the internal use of Opiates and Cordials. From the expiration of this period to the twelfth or fourteenth day, the febrile symptoms are, for the most part, acute, and the patient is best treated by a mild, unirritating diet, by the exhibition of antimonials and gentle laxatives, and, if necessary, by blood-letting. From the third to the sixth week, the febrile symptoms are liable to become occasionally aggravated; and are to be met, according to their urgency, by the treatment just mentioned. Beyond that period the patient, if not decidedly convalescent, is liable to sink from exhaustion and hectic fever, which indicate the necessity of nutritious diet and wholesome air.

In the local treatment of burns, two general and opposite plans seem at all times to have been pursued. One of them has for its object, to alleviate the symptoms of burns by the application of substances which produce a Cooling or refrigerant effect; the other, to heal burns by Heating or stimulating substances. Whether the one of these modes of treatment be in every instance preferable to the other, is a question upon which the profession is by no means agreed. From the sequel of the passage already quoted from Baron Larrey's work, it appears that this distinguished surgeon is decidedly opposed to the refrigerant applications in general use. He declares that he has been long struck with the bad effects of repellants, such as fresh water with ammonia, oxycrate, the vegeto-mineral water, and the solution of opium in ice-water, which are extolled in some modern books; and he expresses his belief that cases

frequently prove fatal for want of more judicious treatment. He recommends that all deep burns should be dressed with fine old linen, spread with saffron ointment. The employment of this ointment, or of honey instead of it, is to be continued till suppuration takes place. When this is established, Larrey employs the ointment of styrax, for the purpose of promoting a detachment of the eschars, and checking the extent of sloughing. As soon as the dead parts have separated, the Baron again has recourse to the saffron ointment, for which he gradually substitutes dry lint, or stripes of linen spread with cerate, checking luxuriant granulations by touching them with lunar caustic, or solutions of the metallic salts. · Internally, Baron Larrey recommends warm emollient and antispasmodic beverages. His patients are never deprived of light nourishment, broths, jellies, eggs, soup, &c.; "his experience having," he says, "taught him, that soldiers cannot bear low diet so well as persons leading an inactive life."

Notwithstanding the above observations of Baron Larrey, to whose extensive experience as an army surgeon every deference is due, I am greatly inclined to lean to the practice of using cold applications, which were recommended so long ago as the days of Rhazes and Avicenna, and advocated in later times by Sir James Earle, who, in "An Essay on the Means of Lessening the Effects of Fire on the Human Body," has recommended the use of cold water, or of ice; the burned parts to be immersed in the cold water, or covered with cloths dipped in the same, and changed from time to time, as they acquire warmth from the part. Where the burned part admits of being immersed in cold water, this proves, of all modes of treatment, the most soothing and agreeable to the feelings of the sufferer; and from considerable experience, I am satisfied that no mode of treatment will be found more generally efficacious. It is, I conceive, a great recommendation to remedies of this class, that they are so easily commanded in military practice; for here we are frequently restricted in our choice, and often obliged to have recourse, not to those means which we may think best, but to those most available at the moment.

To show the extent to which cold applications have been carried, a case may be mentioned, the treatment of which

devolved upon myself, some five-and-forty years ago, when quartered at Prince of Wales Island. A native horse-keeper, belonging to one of the field officers of my regiment, had the whole of his back, from the nape of the neck down to the buttocks, severely scalded, in consequence of having had a large pot of boiling water spilt about him, while he lay asleep on the ground. The agony which the poor man suffered appeared to be extreme, and as the readiest means of relief, I directed him to sit down in a stream of water which ran past the stable where the accident happened. This advice he and his family, who were present, did not seem to relish; but the experiment was insisted on, and the patient's expressions of agony were speedily turned into laughter at me and my prescription. He was kept sitting in the rivulet from midday until sunset, with his back up the stream; and on coming out there was little or no perceptible mark of the injury, and he immediately returned to his duty. This practice, instituted upon the spur of the moment, is not however applicable in all climates, nor is the application of cold generally eligible in cases of extensive burns. In many such cases the general collapse of the system, the oppressed breathing, and the shiverings, positively forbid it, and stimulating or unctuous applications are much more suitable.

To the class of cold or refrigerant applications may be referred the use of vinegar, which, either pure or diluted with water, or mixed up into a thin paste with clay, is a remedy which has been in use from very remote times. In the latter form, it is mentioned as a remedy for burns in the writings of Celsus; and in more recent times, it was again brought to public notice by the late Mr. Cleghorn, an eminent brewer of this city, of whose practice a detailed account is given in the second volume of the "Medical Facts and Observations." Where this application has been used cold, in the slighter cases of burns, its employment, from the coldness alone, is highly gratifying to the feelings of the patient. But in more severe cases, where the cuticle is detached, the smarting produced by the application is often so great as to render it intolerable. A common domestic remedy for burns, in this country, is the application of a pulp of raw potatoes, formed by scraping or grating them down, and applying them in the

form of a cataplasm; an application in which no virtue seems to reside, beyond that of its cooling effect.

Stimulating applications have also been long in use, both by scientific and empirical practitioners; and of this class one of the most ancient, one of the most vaunted, and perhaps one of the least employed, is the application of heat. This is a prescription as old as the time of Aristotle; and "of all the hot and attractive things," says Paré, "which, by rarifying, drawing out, and dissolving, assuage the pain and heat of combustion, the fire challengeth the first place, especially when the burning is small." This practice of employing extraneous heat for the cure of burns has also been recommended by Wiseman, who observes, that by holding a burning hot iron to the part, the "fire calls forth that fire it made; *omne simile, simili gaudet; vel similem sibi trahit; ignis ipse est sui ipsius alexiterium.*" Heister, Van Sweiten, and various other writers, give their opinions in favour of the same practice; but all these high authorities have weighed but little against the pain and suffering which the practice necessarily implies, and it has therefore never been employed to any considerable extent. Applications, however, so far analogous to this as to excite pain by their application, and to stimulate the burnt surface, have been recommended by numerous writers. Of these the most remarkable are alcohol, and spirituous applications, in favour of which we have the testimony of Sydenham, and, in later times, that of Lombard, in his "Clinique des Plaies par armes à feu," where he urges strongly the use of alcohol, and gives the case of a young woman, and the cases of two artillerymen who were severely scorched with gunpowder, and treated successfully by the use of compresses dipped in spirit of wine.

Several of the ancient writers mention resins and turpentine amongst the remedies in common use for burns; and Heister observes, "that in the first species of burns, oil of turpentine has good effects, if you apply it in time, and repeat it frequently." It is, however, chiefly through the medium of two essays, published by the late Dr. Kentish of Newcastle-upon-Tyne, that the oil of turpentine has been recommended to the attention of the profession as a remedy for burns. The accidents of this kind which Dr. Kentish

had occasion to treat, were those which occur from the explosion of hydrogen gas in coal mines, and which are, in many respects, akin to those arising from explosions of gunpowder. Although Dr. Kentish's theoretical views are not very satisfactory, the practice which he recommended was at one time very generally adopted; and in extensive burns, with great collapse of the powers of life, I am inclined, from considerable experience, to consider it advantageous. In the advanced stages of sloughing burns, turpentine and resinous applications are perhaps the best we can employ to promote the detachment of the sloughs.

Besides those remedies, which are unequivocally either of a refrigerant or of a stimulating character, there are numerous other applications of an intermediate description in daily use, and it is proper for the military surgeon to make himself acquainted with every variety of these. One of the most common is the Linimentum aq. calcis, or "Carron oil," a remedy of all others of which I have had the most extensive personal experience. This is a remedy peculiarly useful in those numerous cases where, either from the seat or extent of the burn, the employment of cold applications may be questionable; or where, on the other hand, from the active powers of the system remaining entire, and the sensation of the affected parts not only unimpaired, but morbidly increased, the application of stimulants may be more calculated to increase the patient's sufferings than to expedite his cure. Lunar caustic has been recently recommended as an application to burns, when there is extensive superficial lesion with intense redness and pain, or vesication; and in such cases it is said that under its use all uneasiness quickly subsides, and in a day or two the only traces of injury are the desquamation of the blackened cuticle; but it is only in slight and limited burns that I have seen it employed. Other applications of an astringent character have been sometimes made to burns, and of these ink is strongly recommended by Lombard, in his work on wounds from firearms; and he refers to Galen, Avicenna, and Paulus of Egina, in support of this remedy. Of its use I have no personal experience, nor have I thought it necessary to ascertain what was the composition of the ink used by those ancient writers; but from the astringent nature of the ink used in modern days,

it would seem to be no irrational application to burnt surfaces, either immediately after the receipt of the injury, or at a subsequent period, when in the progress of the cure the granulations are apt to become luxuriant and unhealthy.

Although it would be vain to attempt an enumeration of all the popular remedies for burns, yet there are two practices which it becomes necessary to notice particularly, as they have of late been very greatly commended and very extensively employed in the treatment of burns—the envelopment of the parts in cotton—and the sprinkling or dredging of the burnt surface with flour. The use of the former we have borrowed from the Americans; the rationale of its employment I am not perhaps very fully acquainted with, nor am I satisfied of its superior efficacy. The application of flour to burned surfaces is another practice which has been lately adopted, but which does not appear to me to possess any very obvious advantage. It has often the effect of locking up the purulent secretion until it acquires an offensive character; while I am not satisfied that the inflammation is diminished or the suppuration rendered less extensive by its application. In short, the advantages of the two last-mentioned remedies seem to me to be almost entirely of a negative kind, and in so far as they check the meddling officious spirit which sometimes prevails amongst young practitioners they may be highly useful; but when we look to the endless variety of remedies which have had a transient reputation as specifics for burns, we naturally become sceptical as to the superior virtues of any one of them.

In burns from the explosion of gunpowder, particles of the powder, as already observed, are often forced into and lodged in the skin. These we are recommended by some writers to pick out with the point of a needle, or other convenient instrument; and if this can be easily accomplished there is no great objection to it; but it seems to me scarcely necessary to pay much attention to this point. No military man will be thought the worse of for having a few grains of gunpowder lodged in his skin; while, if the severity of the injury has been such as to lead to free suppuration, the grains of gunpowder are removed by it.

ULCERS.

The treatment of ulcers of the legs was, at no very distant period, one of the most essential parts of the duty of a military surgeon, and until the doctrines of inflammation and its consequences were simplified and established upon a rational basis; until, in short, we saw distinctly how little art and how much nature contributes to recovery, the remedies employed for the cure of ulcers were endless in number, and often injurious in effect. A more rational pathology has taught us that very simple means will accomplish everything which art can effect in the treatment of ulcers, and circumstances have concurred to render the employment even of these simple means less frequently necessary.

In the introductory part of a treatise upon ulcers of the legs, published by Sir Everard Home, there are some interesting observations on the frequency of this complaint amongst soldiers, and on the state of decrepitude and inefficiency to which regiments were sometimes reduced by the prevalence of ulcers. Sir Everard observes that "no surgical complaint incident to the soldier has deprived his Majesty's service of so many men as that of ulcers in the legs"—a remark which will not apply to the present state of the service. This favourable change is partly to be attributed to an increased vigilance in excluding from the service men who are suffering, or who may have suffered from this complaint previously to their enlistment, partly to the improved modes of treatment which have been adopted, but, above all, I believe to the great amelioration in the condition of the soldier which has taken place under the auspices of the late Duke of York and his distinguished successors in office. The increased comforts with which the soldier is provided; the prospect of obtaining his discharge at the end of a stated time, without having recourse to stratagem to procure it; the prospect of a pension, small as it may be, upon completing a given period of service; the diminished frequency and extent of corporal punishments; and the difficulty of finding employment in manufacturing and agricultural pursuits, are all circumstances

which have greatly tended to make a soldier's life more desirable, and must have a powerful effect in diminishing the frequency of ulcers, by taking away the temptation to produce or to aggravate such complaints.

We have now no ulcer of any formidable character occurring in the army on home service; but in other quarters of the world this disease has very frequently, and indeed very recently, been the cause of severe and protracted suffering to individuals, and of serious detriment to the public service. The troops suffered severely from this cause at Prome and Rangoon during the first Burmese war, and from the "Statistical Reports," ulcers appear to be frequent in some of the localities in the West Indies. Judging from their comparative frequency in the Windward and Leeward Island Command, they have been conjectured to depend in some degree on the same remote causes as fever. The ravages of this disease in the navy, under one of its most formidable aspects, was formerly such as to have literally crippled whole fleets, and forced them to quit their stations. Sir Stephen Hammick, formerly surgeon to the naval hospital at Plymouth, states that such was at one time the prevalence of ulcers amongst the seamen, as to have led to the amputation of not less than fifty limbs in that hospital in the course of one year; and from tables published in Mr. Copeland Hutchison's work, it appears that in the two great naval hospitals of Haslar and Plymouth, there were admitted during the last war 7065 cases of ulcer; of these 144 died, 198 had their limbs amputated, and 1089 were invalided. The late "Statistical Reports on the health of the Navy," have brought to light some remarkable "and but ill explained" circumstances in regard to the comparative frequency of ulcers in different classes of ships serving on the same stations. It would appear that they are by much the most frequent in line-of-battle ships, next in steamers, and least of all in frigates.

It is foreign to my purpose to enter into a detailed account of the classification, appearances, and progress of ulcers as they are met with in this country; but it is necessary to advert to a distinction very properly observed by all intelligent writers upon this subject, between ulcers depending upon an

accidental or local cause, and those depending upon disorder of the general health, or a depraved habit of body. Besides this division of ulcers into local and constitutional, or specific, other subdivisions calculated to suggest the most appropriate applications have been adopted. Of these, one of the most useful is that of the late Sir Everard Home, who considers the impediments to the cure of ulcers as occurring from a defect or excess of action, which defect or excess may arise either from a general fault in the constitution, or in the part in which the ulcer is seated. And in the treatment of a simple ulcer, when the healing process goes on in a kindly manner, it will readily be understood, that beyond the necessary attention to cleanliness, and the removal of a superabundance of purulent matter, the surgeon has but little to do; indeed, the less he interferes with the process of nature the better, any over activity on his part will in all probability retard the cure.

The following remarks must be looked upon as more peculiarly applicable to ulcers of the inferior extremities. In this situation they are by far the most frequent, and here also various circumstances concur to render them difficult of cure. While no part either of the surface of the body, or of the membranes which line the different canals, are exempt from ulceration, yet the integuments, the muscular and tendinous parts of the legs, are peculiarly the seats of this disease; and here the proximity of a large extent of the tibia to the surface, the languor of the circulation, partly by reason of its distance from the heart, and partly by reason of the dependent position of the limbs, are circumstances calculated to retard the cure. The influence of these circumstances is rendered very conspicuous by a statement of Sir Everard Home, published on the authority of Dr. Young, who served several years as a regimental surgeon in the West Indies. Dr. Young observed, that "in the 32d regiment there were 145 tall men, and 276 short men; that in the course of four years twenty-two were discharged from those of the first description, and only twenty-three from the second, on account of ulcers of the legs;" and this remarkable observation does not stand alone, but is quite coincident with my own experience and with that of others.

In the treatment of ulcers of the legs, two general and

opposite principles have been enjoined—Exercise and Rest; and each of these has in recent times had its abettors. Is a patient with an ulcer on his leg to keep himself still and quiet? Is rest absolutely necessary for his cure? Or may he be allowed to walk about as usual? These are questions which constantly present themselves, and have not hitherto received, nor do they indeed admit of any definite reply. So numerous and so various are the circumstances, apparently trivial in themselves, by which ulcers are affected, that it is vain to attempt, upon general principles, to determine the quantum of exercise or of rest to be recommended, whether the object be to increase action or to diminish it—to correct the local disease, or to improve the constitution. Exercise, as a remedy, in cases of ulcerated legs, has been insisted on by some, but the advice is too general to be very useful; and notwithstanding the number of instances adduced to corroborate the truth of the doctrine, many exceptions must be admitted.

In cases of ulcers on the lower extremities, accompanied with a state of irritability, or disposition to violent and inordinate action, where the edges are inflamed, and the surface exquisitely tender and painful, covered with a thin ichorous discharge, free and unrestrained motion proves highly injurious; but the advantages of rest and a horizontal posture are obvious. The inflammation around the ulcer abates, the pain and tension subside, and well-formed pus is secreted, to the great relief of the patient's feelings. It may also be remarked here, that ulcers accompanied with a varicose state of the veins of the leg, are in many instances cured by horizontal posture and well-applied bandages, without resorting to the hazardous, and often unsuccessful expedient of dividing, tying, or otherwise obstructing the varicose veins. Ulcers, on the other hand, accompanied by excessive languor in the circulation, œdematous swellings and coldness of the feet, such as are usually met with in chlorotic patients, in persons advanced in life, or in persons who follow a sedentary occupation, are speedily improved in their appearance by the moderate use of exercise, with a roller applied from the toes to the knee. And I may add, that the healing of ulcers under a moderate share of exercise is found to be much more permanent, and the

ulcers less liable to break out again, than when cured in the horizontal posture.

Although the formidable ulcers which occur in our Eastern possessions are almost the only serious complaint of this kind which we have now to contend with in the army, yet it is necessary to observe that the description of ulcer which formerly deprived the service of so many men, and which is still occasionally met with, is that characterized by Sir Everard Home as the indolent ulcer: "Ulcers in parts whose actions are too indolent to form healthy granulations, whether this indolence arises from the state of the parts or of the constitution." Length of continuance alone gives an indolent character to an ulcer; and it is immaterial whether at an early period it was healthy, whether it was attended with weakness and defective action, or whether it was irritable and sloughing, if not cured within a certain time it becomes indolent; and to this condition all ulcers of long standing are ultimately reduced. The edges of the surrounding skin become thick, prominent, smooth, and rounded; the granulations soft, smooth, pale-coloured, and glossy on the surface; the pus imperfectly formed, and often mixed with flakes of coagulating lymph, which adheres tenaciously to the surface of the granulations, and is with difficulty removed. In indolent ulcers there is a backwardness to form granulations, and in those that are formed a want of sufficient strength to complete the cure. Such granulations are unable to support themselves beyond a very short period; and although the ulcer proceeds slowly towards amendment, so long as the granulations stand their ground, these are often suddenly absorbed, and the ulcer spreads nearly to its original size. Twenty-four hours may undo all that had been accomplished in so many days, or even weeks. This is a change which takes place so frequently, and under such different circumstances, that it cannot be attributed to any external cause, but must be supposed to arise from the granulations which are formed in that indolent state of parts being unfit for the purpose for which they were intended; and in such cases the object of our treatment should be, not simply to heal an ulcer, but to render the cure as permanent as possible.

In adverting more particularly to the dressing of ulcers,

I may observe, that whenever the disease has become prevalent amongst soldiers or seamen, the question of contagion, although seldom solved satisfactorily, has generally presented itself in an important point of view; and, with reference to this subject, we are all too familiar with the common expression of erring on the safe side. No error, strictly speaking, can be considered safe, and least of all such error as tends to the diffusion of false alarms, or the waste of time in adopting idle and inefficient precautions against the supposed contagion of disease. At the same time, I am most ready to admit that, with reference to the present case more than to most others, the usual precautions against contagion in the way of cleanliness and ventilation are obviously calculated to benefit the individual, as well as to ameliorate the situation of his comrades and fellow-sufferers. The following directions, therefore, copied from the "Code of Instructions to the Surgeons of Her Majesty's Fleet," are, in my opinion, deserving of every commendation :—"Should ulcer at any time become prevalent among the crew, the persons so affected are to be kept apart from the ship's company, and as much as possible from each other, and the strictest attention is to be observed that the removed dressings be thrown overboard, and the foul bandages immediately put into a bucket of boiling water, for the purpose of destroying all contagious or infectious matter. The surgeon is to allow every ulcerated patient a sponge to himself, which is daily to be purified in boiling water, and the ulcers of no two patients are to be washed in the same water. When an ulcer shall have run into a sloughing stage, the patient is to be kept entirely apart from the others, and in a situation where the best degree of ventilation can be preserved."

With a view to produce granulations of a healthy character, various stimulating lotions and unguents have been employed. Of the lotions, those containing small proportions of the nitrous and muriatic acids, solutions of the nitrate of silver, of the sulphates of copper, of iron, and of zinc, have proved the most generally useful; and latterly the black wash, solutions of the chlorurets of soda and of lime have been much employed. Of ointments, I know none more efficacious than those containing the red oxide, or the nitrate of quick-

silver, and the subacetate of copper. With a variety of these applications, it is necessary for every practitioner to make himself acquainted; for under a continued use, the best of them will fail, while it is only by occasional changes either in the nature or strength of the application, that a progressive amendment can be kept up. In the treatment of indolent ulcers with callous edges and surrounding œdema, blisters have of late been very frequently and successfully employed by my colleague Mr. Syme.

When an ulcer, whatever may have been its original character, is once reduced to the state of what is termed a simple purulent ulcer, the employment of adhesive straps, as recommended by Mr. Baynton, will be found greatly to accelerate the cure, and to render the recovery more perfect, by approximating the edges of the ulcer, and diminishing the extent of the surface to be cicatrized. When the discharge is inconsiderable, the adhesive strap is generally applied to the surface of the sore without any intervening substance; but even in cases where a considerable secretion of purulent matter takes place from the surface of an ulcer, the adhesive strap may occasionally be employed with advantage, by covering the sore, in the first place, with a little lint, and then surrounding the limb with a strap. The adhesive strap is a remedy of great importance in the treatment of ulcers of the legs, and is almost the only practice within my recollection the merit of which is not overrated by its author. I can vouch for its efficacy in the treatment of such ulcers under circumstances highly unfavourable, and in climates the most unhealthful. But a testimony, perhaps less partial and more creditable to the practice, is that of M. Roux, who, in his Parallel of French and English Surgery, does ample justice to this mode of treatment, although it appears that he came to this country with anything but prepossessions in its favour.

The means of counteracting the attempts sometimes made by soldiers and seamen to excite ulcers or retard their cure, will be noticed in the section on factitious diseases. And in recapitulating the leading remedies for the treatment of ulcers, I would observe, that in the highly irritable and painful state of ulcers, with much surrounding inflammation, emollient

cataplasms and anodyne fomentations are the applications most likely to be borne with patience, or to be attended with advantage; while, in some cases of this kind, I have seen the very best effects from the continued application of compresses soaked in cold water. In gangrenous and sloughing ulcers, I know of no application more generally beneficial than the hot dressing consisting of turpentine and resinous ointment. When stimuli, in a watery or unctuous form, are likely to be beneficial, those formerly enumerated will answer every purpose; and I may remark, that the watery solutions of the metallic salts may be, to a certain extent, combined with the use of the adhesive strap, the ulcer being washed with the lotion at each dressing, previous to the application of the plaster.

SCURVY AND SCORBUTIC ULCERS.

The preceding observations apply generally to the treatment of ulcers under all circumstances, but we have farther to consider the treatment of those formidable ulcers which are obviously connected with deterioration of the general habit, or constitutional disease. Of this class of ulcers, by far the most important are those which have been termed Scorbutic. It is perhaps in the shape of destructive ulcerations that scurvy has manifested its worst features; and with reference to the treatment of such ulcers, I am induced here to offer some observations on the other characters of this formidable disease.

The advanced stages of scurvy are marked by symptoms indicative of great changes in the habit of the individual affected by it—a great inactivity both of body and of mind—an indisposition to exertion—loss of muscular strength—a bloated œdematous aspect—swelling and ulceration of the legs—livid patches or ecchymoses on different parts of the skin—soft and spongy gums, with frequent discharges of blood from them. These symptoms are familiarly known as incident to seamen upon long voyages, and particularly when confined to salted meat, with a scanty allowance of vegetable or farinaceous matters. Such were formerly the disastrous consequences

from the prevalence of scurvy, that Sir Richard Hawkins, a distinguished commander in the time of Queen Elizabeth, states that, in the course of twenty years, he had known ten thousand men perish from this disease out of the comparatively limited establishment of those days, and numerous instances are recorded of the losses and miscarriages of naval enterprises from this cause.

Scurvy was long looked upon as almost exclusively a disease of seamen, and some of the technical appellations bestowed upon it, such as *Porphyra nautica*, are indicative of this; but almost in proportion as the disease has ceased to be prevalent in that branch of the service, we have seen, on some occasions, ulcers, both in their general and local features, obviously scorbutic, proving most destructive to the troops; and in other cases genuine and unquestionable symptoms of scurvy without ulceration, prevalent amongst the land forces. Some valuable reports upon this disease, as it appeared recently at the Cape of Good Hope, were forwarded by the late Deputy-Inspector-General Murray, and communicated to the public by Sir James M'Grigor, in the London Medical Gazette. From these reports, which embody, along with the views of Dr. Murray, those of Mr. Bailey of the navy, and of Assistant-Surgeons Armstrong, Dolmage, Ford, and Malcolm, it would appear that amongst the troops serving in Caffreland, particularly in the 75th regiment, numerous cases of scurvy had manifested themselves, "at a time when the men had no harassing duties, and were abundantly supplied with rations of good fresh meat, without having had an ounce of salt provisions." Scurvy is now well understood to have been the main cause of all our sufferings in the Crimea during last winter. Upon this point, Dr. Deas, an old pupil of this class, and now at the head of the medical department of the Black Sea fleet, expresses himself as follows, in a letter to me, dated from Balaklava, 18th January last:—"Our people had almost all more or less of a scorbutic taint long prior to a shot being fired. What fever spared in autumn was gleaned by scurvy in the winter; and I may tell you, in a general way, that the results of our operations have not been satisfactory—secondary amputations most especially the reverse. No man can calculate the evils resulting from the scorbutic taint which is amongst us.

Our dysenteries and diarrhœas become quite uncontrollable when the taint is even but slight."

The various theories of scurvy brought forward by systematic writers have been most generally, and perhaps most usefully, connected with their views of its origin and causes. In this case, the homœopathic maxim, "*similia similibus curantur*," will not hold good; and, on the contrary, I believe that, generally speaking, the sooner that the circumstances of the sufferers as to locality, diet, regimen, and occupation, are reversed, the better. Recent experience, of which the case just referred to in the 75th is a remarkable instance, forbids us to attribute scurvy, as was formerly done, solely to the use of salted provisions; and I am strongly inclined to believe, that all insufficient, exclusive, or artificial kinds of diet, if long persevered in, are apt to produce symptoms of this disease. Indeed there appear to be strong grounds for believing that the comparative exemption of seamen from this disease, of late years, is more owing to the great attention paid to varying their diet, than to the small allowance of vegetable acid. In the case above alluded to, the causes seem to have been very obscure, and Dr. Murray has given it as his opinion, "that no single cause can be assigned for its production which does not admit of being reasonably questioned, and that several causes concurred which are yet difficult to be defined." Atmospheric influence, exposure to oppressive heat in the day, and to damp in the night, insufficient shelter, scanty or irregular supply of vegetables, and in several cases intemperance, would seem to have been the more prominent.

Scurvy has in general been so obviously the result of faulty diet, that the correction of this evil has been chiefly looked to as a means of relief; but Dr. Murray, and some of his correspondents, seem to think that in this disease more active remedial measures, and particularly a decided antiphlogistic treatment, bleeding and saline purgatives, is beneficial. Of this mode of treatment I have no personal experience, and it would be idle in me to theorise; but I conceive that there is much good sense in the following observations of Mr. Ford, who says that although he does not wish to be considered prejudiced against the treatment by depletion with the lancet and purgatives in the early stages of scurvy, yet adds, that

when the disease is not arrested at the outset, and "has by long protraction assumed the asthenic character, the patient having become sallow, dejected, feeble, apathetic, and disease of the lymphatic system appearing to predominate, I am of opinion that this practice is contra-indicated, and that other means must be adopted to restore the vitiated condition of the blood." The following concluding remarks of Dr. Murray are well deserving of attention from military and naval surgeons:—"Those who have witnessed the effects of scurvy know it to be one of the most insiduous and disabling diseases that can attack an army or a fleet, and the necessity of medical officers being well acquainted with and on their guard to prevent it, is the more indispensable, as it generally occurs under circumstances where the best means of cure (vegetables and fruits) are unattainable. I must observe, that what may seem trivial and uninteresting to practitioners in civil life, is often of infinite importance to medical officers."

The use of fresh meat and vegetables must ever be looked to as the great desideratum with a view to the prevention of scurvy, and to the preservation of the health and vigour of ships' crews, or of troops on ship-board. Upon the subject of diet, Dr. Deas observes, with reference to their position in the Crimea and Black Sea, at the time he wrote, "I have my doubts if even fresh diet will be found to be a sufficient protection. Lime-juice with salt diet is certainly not so." When, from the deficiency of these, anything of a medicinal character becomes requisite, the lime-juice is by common consent looked upon as the most efficacious remedy, and its use in sea-scurvy is by no means so novel a practice as many imagine. Nothing can be more explicit than the recommendation given of this medicine by Woodall, upwards of two hundred years ago:—"I finde we have many good things that heale the scurvy well at land, but the sea chirurgeon shall do little good at the sea with them, neither will they endure. The use of the juyce of lemmons is a precious medicine, and well tried; being sound and good, let it have the chiefe place, for it will deserve it. It is to be taken each morning, two or three spoonfuls, and fast after it two hours; and if you adde one spoonful of *aqua vitæ* thereto, to a cold stomach it is the better. Some chirurgeons also give of this

juyce daily to the men in health as a preservative, which course is good if they have store, otherwise it were best to keep it for need. I dare not write how good a sauce it is at meat, lest the chiefe in the ships waste it in the great cabins to save vinegar."

It was not, however, until 1794 that the lime-juice was successfully recommended to the government by the naval surgeons of the day, and liberally supplied at the public expense as a means of prevention. From this time the scurvy declined so rapidly that in two years it was extinct, and there are now surgeons in the navy of long standing who have never seen a case of it. One of the most striking proofs of the beneficial change which has taken place in this respect is given by Sir Gilbert Blane, who states, on the authority of Dr. Lind, that in one of the first years of the American war, six thousand and sixty-four men, mostly affected with fever and scurvy, had been sent ashore from the Channel fleet in the course of four months; that on another occasion, after a ten weeks' cruise, two thousand five hundred men were brought into port ill of scurvy; while the fleet under Lord St. Vincent, which blockaded Brest in 1800, consisting of twenty-four ships of the line, kept the sea from the 27th of May till the 28th of September, without one of them being in port, without the men having a single meal of fresh meat, and without sending more than sixteen to hospital. It would appear that the lime-juice issued to the navy has been deteriorating of late years, and that grave suspicions are entertained of its being largely adulterated. Dr. Deas is of opinion that "we require the vegetable mucilaginous matter as it comes from the lemon, as well as the acid the lemon contains."

Were it not for the chance that in some circumstances and situations the supply of lime-juice may be found impracticable, it would be superfluous to mention the various substitutes which have at times been adopted. Of these the most noted are the sour krout, or pickled cabbage, raw potatoes and vinegar, termed by the seamen "scurvy-grass," beer, molasses, onions, nopal, and the earth-bath. In mentioning the last I do not express any confidence in its virtues, but it was a celebrated remedy in the days of Commodore Anson; appears to have been used in later times, as we learn from Knox's account

of the American Campaigns under Lord Amherst and General Wolfe; is said to be still in use amongst the seamen employed in the whale fishery; and, as appears from the "Bombay Transactions," was recently employed by Dr. Hardy in some cases of scurvy amongst the crew of the Palinurus, a surveying vessel on the north-east coast of Africa. The good effects expected, and said to be derived from this remedy are probably attributable more to its influence on the minds than on the bodies of scorbutic patients, who, to say nothing of the superstitious character of seamen, are often of a most desponding turn, likely to be benefited by any measures which show an interest in their fate, or which they can be led to look upon as a means of cure.

I may mention, as an additional resource—a practice of which I have no experience, and no sufficient means of judging, but which is strongly advocated by Dr. Henderson of the navy, in the fifty-second volume of the Edinburgh Medical Journal—the exhibition of the nitrate of potass in solution. From this very decided benefit is said to have been derived in the case of some convicts labouring under scurvy, during a voyage to New South Wales. In this instance the nitrate of potass was obtained from the gunpowder of some cartridges borrowed from the officer of marines, who remarked that he would always recollect the Doctor as the Medico who cured scurvy with ball-cartridge. It is perhaps scarcely necessary in the present day to give any caution against the use of mercury in scurvy, or to refer to Kramer, who was physician to the imperial armies in Hungary in the early part of last century, and who tells us that of 400 men affected with genuine scurvy, to whom, on the advice of Boerhaave, mercury was given so as to induce salivation, not one survived.

When seamen or soldiers are placed in situations favourable to the generation of scurvy, it is well known, that long previous to the occurrence of those symptoms which I have mentioned as marking the more advanced stages of the disease, their constitutions become so far impaired, as to give a peculiar character to diseases under which they may accidentally labour. This has been more particularly observed with regard to dysenteric complaints, and to ulcers of the legs, the latter often originating from the most trivial scratches or

accidental wounds, and even from the bites of minute insects. This last-mentioned cause I have known to be productive of the loss of several lives, and of many limbs, sometimes rendering their removal by amputation necessary, and at other times leading to such extensive sloughing of the muscular and tendinous parts, as to produce irremediable contractions and distortions of the limb. The disastrous consequences here alluded to occurred in the 2d battalion of the Royals, with which I proceeded to India in the year 1807. This regiment was full five months on the voyage from England to Prince of Wales Island, without touching anywhere for water or provisions; the men's constitutions were in consequence much tainted with scurvy, and upon being exposed to musquitoe bites after landing, the trifling sores produced by these animals degenerated into ulcers of the most formidable description, thus affording an example of a very common occurrence—an ulcer acknowledging both a local and constitutional cause. In such cases the ulcerative process advances with great rapidity, and soon removes a great extent of parts, sparing nothing which comes within its range. The blood-vessels are thus exposed to the ravages of ulceration, and we have occasionally an extensive hæmorrhage superadded to the other effects of the ulcer. Sometimes an ulcer, after having extended itself rapidly for a time, appears to receive a check, and becomes stationary for a long period; sometimes it even advances towards a cure, and again suddenly resumes a destructive action.

These phenomena were remarkably conspicuous in those ulcers which occurred amongst the men of the Royals after their arrival in India. It was then a very common thing to find an ulcer to all appearance doing well at the evening visit, and upon inquiring for the patient next morning, he would frequently observe—"My leg is going back, Sir." And this alternate deterioration and improvement in the appearance of ulcers occurred often without our being able to give a satisfactory account of it, or to promote the amendment of such sores beyond a given point. Large ulcers, as I have already hinted, were often attributed to very trifling causes, such as scratches, bruises, and, above all, to the bites of musquitoes, which in place of healing up kindly, degenerated into foul and painful

sores, with ragged edges, extensive surrounding inflammation. and an ichorous offensive discharge. These ulcers, for the most part, spread rapidly, and often, as it were, by piecemeal—large portions of the inflamed parts contiguous to the ulcer falling out in gangrenous patches, and often laying the bones bare; while the patients suffered severely from pain, restlessness, general debility, impaired appetite, quick pulse, and other marks of constitutional irritation.

These ulcers were at the time very generally, and I am still of opinion, very justly, attributed to the prevalence of a scorbutic diathesis in the men's habits from a long sea-voyage. It is necessary, however, to state, that sores of a similar description have been observed in these localities in circumstances where the usual causes of sea-scurvy did not exist. In a collection of official papers on the Medical Statistics and Topography of Malacca and Prince of Wales Island, printed in 1830 by order of the government at Penang, we have an account by Dr. Ward of the Madras establishment, of a destructive ulcer prevalent amongst the native troops at Malacca in the years 1827-28, which appears to me to resemble, in every respect, the ulcer which I formerly had an opportunity of seeing amongst the European troops in that quarter. And instead of attempting a more minute description of this ulcer from my own remote experience, I prefer giving the following from Dr. Ward, who observes that "these ulcers appeared in two forms, the common and the phagedænic, the former differing little from ulcers occurring at other stations in India, the latter appearing in two distinct varieties, the acute and chronic phagedæna.

"The first or Acute variety commenced, if in a previously indolent ulcer, by a small circumscribed fiery spot; if on the sound skin, however, by a minute, bright-red irritable pimple, which, on being scratched, was soon converted into an ulcer. The after-course was in both cases the same. It extended rapidly, with great pain and constitutional irritation, sometimes reaching the size of a half-crown piece in less than twelve hours. There was little discharge from it; and when any, it was of an ichorous and acrid nature. The edges were raised, ragged, often deeply indented, resembling the outline of a map, and of a purplish or red colour. In a few

days it extended over a considerable portion of limb, involving in destruction muscle, tendon, and ligament, which were soon converted into a black or brownish slough." In this respect, it somewhat resembled those cases described by Mr. Leslie in his papers on the sloughing ulcers of Prince of Wales Island, published in the third volume of the Calcutta Medical and Physical Society's Transactions. "The constitutional symptoms were, considerable fever, white, dry, and loaded tongue, great irritability, restlessness, and almost total sleeplessness. It generally occurred about the ankles, or on the front of the tibia; in only one instance in the upper extremities, and that in an opened abscess. If the progress of the disease was not checked, the ulcerative process went on, the irritability and fever increased, and the patient died, apparently worn out. In most instances, however, when proper treatment was adopted early, the pain lessened, the slough began to separate, the edges became more regular, the constitutional symptoms decreased in violence, pus was thrown out, and granulations commenced."

"The second or Chronic variety was more frequent than the foregoing, and equally destructive, though slower in its progress. It occurred generally in weak sickly men, and seemed connected with a scorbutic state of the system. The pain and constitutional symptoms were much less violent than in the acute variety; indeed, in the most severe cases, least pain was complained of. There was much restlessness, however, and great anxiety of countenance. The characteristics of this ulcer were its slow progress, its raised, clear, and regular shining red edges, a circle of œdema for three or four inches round it, and a thick cream-coloured, yellowish, or brownish-yellow slough, so tenacious, frequently, as to resist the scalpel. The discharges from it were intolerably offensive, so much so, that no one could at first remain in the room appropriated to the patients affected with it without nausea, and fumigations with nitrous acid or benzoin were constantly necessary. It sometimes threw out greenish cauliflower excrescences, which covered the whole face of the sore, and rose considerably above the surface. The muscles, when exposed, were frequently considerably swollen, as if inflated, bulging out in the centre of the diseased mass.

"The ankle and back part of the leg were the parts most frequently affected; and in two or three instances, the ulcer involved great part of the gastrocnemius and soleus muscles, completely destroying the tendo Achillis. When the slough began to separate, the tendons were frequently found hanging in clusters from the half-destroyed muscles. No texture escaped its destructive influence; skin and cellular substance evidently suffered most rapidly; muscles next; then tendon, and lastly, bone. The arteries or nerves were rarely affected. In few cases, when severe, did either form terminate without loss of life or limb, or the destruction of such a considerable portion of muscle, as to render the patient unfit for further effective service. The disease was evidently epidemic, depending either upon some peculiar state of the atmosphere, or upon some cause acting generally upon the whole body of troops. It seemed to attack the young and the old, the robust and the weakly, indiscriminately. Nothing occurred to create any suspicion of its being contagious, though for the sake of certainty, every precaution, such as supplying clean sponge to each patient, avoidance of contact, or crowding, and separation of the bad cases from the more simple, was carefully taken."

Ulcers of a similar character were prevalent amongst the Madras sepoys at Ceylon during the insurrection of 1817 and 1818, as noticed in Mr. Marshall's interesting topography of the interior of that island; and as they were frequently observed to succeed to leech bites, they have been very absurdly attributed to the "poisonous leeches of Ceylon;" but the medical staff, serving on the island at the time, saw more adequate and satisfactory causes for their production, in the very reduced diet, excessive fatigue, inclement weather, and privations of every kind to which the troops were subjected. Such ulcers also prevailed both amongst the European and native troops at Prome and Rangoon, and there they seem to have been considered decidedly of a scorbutic nature. It appears from Mr. Welch's account of the diseases prevalent in the 89th regiment, that his patients suffered greatly from privations of all kinds engendering a scorbutic diathesis; and Mr. Paterson of the Madras establishment, who served with the troops employed at Rangoon, in reply to a letter

written to him at my request, states in very decided terms, that the ulcer prevalent there was of a scorbutic character, obviously attributable to insufficient diet, and that it was not contagious.

In the treatment of those ulcers which occurred amongst the men of the Royals at Prince of Wales Island, little could be effected by the use of any local applications, unless, at the same time, attempts were made to invigorate the constitution by generous diet, bark, and wine; but unfortunately the digestive powers and the functions of the alimentary canal were, in many instances, so materially impaired, as to prevent our obtaining any very obvious advantage from the use of these remedies. The men having to contend with the diseases incident to a foreign and unhealthy climate, as well as with the scorbutic diathesis prevalent in their systems from a protracted sea-voyage, it is not to be wondered at, that many of them sunk in the struggle; and while, in the treatment of the ulcers with which a large proportion of the regiment was afflicted, every local application occasionally appeared to do good, there was not one which did not often fail; indeed, it was only by a constant change and succession of applications that anything like a progressive amendment could be kept up. In the highly irritable state in which the ulcers often appeared, with much surrounding inflammation, emollient cataplasms were, in some instances, the only applications which could be borne with patience. In the foul and sloughy state of these ulcers, acid and spirituous lotions, diluted alcohol, tincture of myrrh, and the diluted nitric and muriatic acids were frequently employed. In ulcers of this description, the balsam of Peru was urgently recommended by the late Sir Whitelaw Ainslie, in a letter addressed to the Court of Directors of the East India Company in October 1806; and if I am not mistaken, a favourable opinion of this remedy was expressed by some of the surgeons employed at Rangoon, although my own experience does not lead me to concur in the high encomiums bestowed upon it.

Another application is mentioned by Mr. Geddes in the Medical and Physical Transactions of Calcutta, which I think it right to mention as being abundant in some of the localities where these ulcers prevail. He observes, that "of all the

external applications (and there were not a few) tried on the same or on different individuals, a decoction of cloves or of nutmeg leaves, which were gathered fresh as required, was most soothing to the patient's feelings. These, as they were the produce of the island, and easily obtained, were unsparingly used." When every application has so repeatedly failed in my own hands, I have some hesitation in holding forth any one as deserving a preference ; but if, in the foul and sloughing state of these ulcers, any one application appeared to me more capable than another of expediting the detachment of the sloughs, of cleansing the surface of the sore, and of improving the quality of the discharge, it was the use of the hot dressing, the basilicon or *Unguentum Resinosum* melted with a proportion of turpentine, and applied as hot as the patient could bear it.

In speaking of the treatment of those ulcers prevalent amongst the sepoys at Malacca in 1827-28, Dr. Ward expresses himself as follows :—" The treatment of the Phagedænic Ulcer varied of course according to the form which it assumed. In the first or acute variety emetics of ipecacuanha and tartrate of antimony were invariably given, and sometimes with success at the commencement of the attack. Great attention was paid to the state of the stomach and bowels, the strictest rest was enjoined, and the applications were mild and emollient. Local bleeding, by means of numerous and repeated incisions, through the raised and thickened edges, followed by warm fomentations, were practised in most instances, and tended generally to relieve the pain and irritation, and forward the separation of the sloughs. When there was much fever, the nauseating solution of tartar emetic was diligently exhibited, with occasional purgative doses of calomel and antimony. When the pain was considerable, opium at bed-time, combined with the above, always gave relief." When the violence of action in the ulcer subsided, and the sloughs began to form, the treatment was the same as that of the second variety, now to be described.

" The second or chronic variety of Phagedæna required the exhibition of stimulants and tonics, both internally and externally from the very commencement. The most useful stimulating external applications were the hot dressing, con-

sisting of equal parts of oil of turpentine and unguent. resinosum—diluted and pure nitric acid—solutions of nitrate of silver—balsam of Peru—powdered bark—finely powdered rhubarb—solution of camphor in spirit of wine—powdered bark and nitre—and powdered nitre—with common, fermenting, or charcoal poultices. Liquid applications were always preferred to unctuous ones, at least as long as the sloughs continued. Previous to the application of any of the above, free and numerous incisions were made through the thick tenacious cream-coloured sordes, with a scalpel, until blood flowed. I am inclined to attach some importance to this practice. Little advantage is to be gained from acting on the slough itself; the surrounding and subjacent parts possessing life are to be roused into activity; the remedies must be applied to them; and this, I think, is insured in some measure by the deep incisions above recommended, which afford free access of the stimulating applications to the sound parts. Hence the superiority of liquid to unctuous dressings.

" After the scarifications, the whole surface of the sore was covered with the selected dressings, either spread upon or dipt into lint, sometimes copiously poured over it; and over all the poultice was applied, and kept on by a loose bandage. Each of the above enumerated external remedies was occasionally found highly beneficial; but they required to be frequently changed, as no one seemed to retain its good effect more than five or six days. In the worst form of the disease, that with little pain, and thick cream-coloured or greenish sloughs, where there was evident want of action, the greatest benefit was derived from the application of pure nitric acid, by means of a feather, after scarifications through the sloughs, followed by the use of the fermenting or charcoal poultice. Finely powdered nitre sprinkled over the sore was frequently found efficacious in detaching the foul and offensive sloughs. When these began to separate, and healing spots were visible, the balsam of Peru was found highly beneficial. But both in the chronic variety and latter stage of the acute, the principal confidence was placed in the use of internal remedies; and, above all, in the liberal use of port wine, arrack, bark, or sulphate of quinine, and nourishing diet. Wine was abundantly supplied by the government of Fort Cornwallis. During

the year forty-four dozens of port were used in hospital, administered principally to those affected with ulcers; and to this free exhibition of it I am inclined to attribute the small proportion of fatal cases—five out of a total of two hundred and twenty-two.

As to the question of amputation in those formidable ulcers, my personal experience is not sufficient to guide me to a satisfactory conclusion; but I may remark, that it was in the treatment of sloughing ulcers, when prevalent amongst the seamen in the naval hospital at Madras, that Mr. Curtis, a navy surgeon, was first led to question the propriety of the old maxim of waiting in all cases for a line of separation, and had the merit of operating successfully in opposition to that rule. Mr. Geddes, in the paper already referred to, strongly advocates the propriety of amputation. He states that amongst the sepoys their sufferings were so great, and the first results of the operation so satisfactory, that they cried aloud for amputation or death—"waiting for the line of demarcation was only signing the patient's death-warrant." He mentions as a remarkable fact that out of about forty cases of amputated limbs, only one was met with where secondary hæmorrhage supervened, requiring amputation of the stump above the knee; and goes on to state, that "in the regimental hospital to which I was attached, we had in all fifteen amputations of limbs, besides toes and fingers; and in a military hospital adjoining my own I assisted a medical friend in about twenty more. We saved exactly half our patients."

HOSPITAL GANGRENE.

There is every reason to believe that, under peculiar circumstances, wounds and open sores must at all times have been liable to assume some of the features of Hospital Gangrene. But it is only in times comparatively recent that we have any minute or accurate account of this formidable disease. Although it was seen by La Motte in the early part

of the last century, yet there is no distinct and separate treatise upon the subject of an earlier date than 1783, when an account of it was published in the posthumous works of Pouteau, who, while a dresser in the Hôtel Dieu at Lyons, was himself a sufferer from it, and distinctly ascribes the disease which he witnessed to the contaminated air of hospitals, "au mauvais air qu'on respiré dans les grands hôpitaux." And such was the opinion which this writer entertained of the destructive nature of the malady, that he seriously proposes the following question, "Are hospitals, then, more pernicious than useful to humanity?" The personal sufferings of Pouteau may have probably induced him to look upon this disease in the most unfavourable light; but, at the same time, we must allow that to a person contemplating it as it has appeared in the large hospitals at Lyons and at Paris, and in the British military hospitals at Passages and Bilboa, such a question would not be an unnatural one. In the hospital at Lyons it is said to have carried off eleven-twelfths of all those patients who were attacked by it. In 1814, in the Hôtel Dieu at Paris, out of twenty-two amputations, not one escaped its malignant influence. M. Picard states, that in one of the wards of a hospital at Madrid, which contained a hundred and twenty-six wounded men, not less than fifty-four were seized with it at once. And at Tolosa, in Spain, it cut off a hundred men in two months out of a hundred and thirty wounded.

In a work upon gangrenous phagedæna, published in 1818 by Mr. Blackadder, there are several notices relative to the disease from the older writers, including Celsus, Aetius, Paulus, Rolandus, Guido, and others. From the last-mentioned author Mr. Blackadder gives several interesting extracts, which may be looked on as conveying not only the views of Guido himself, but all that is deserving of notice upon this subject in the works of his predecessors. Although no distinct notice of this disease is to be met with in the writings of Paré under its appropriate name, there can be little doubt that some of his observations refer to hospital gangrene. Our countryman Wiseman, the most distinguished military surgeon of his day, has also some observations on putrid

ulcers, which, without any great stretch of imagination, may be referred to the hospital sore.

The only circumstance casting a doubt upon the nature of the disease described by Wiseman and the preceding writers, is the absence of all mention of the contagious nature of the complaint; but this single circumstance does not necessarily imply a difference in the two diseases; for, as we find that the phagedæna gangrenosa has been expressly described by authors without any notice of its contagious nature, it is quite possible, on the other hand, that contagion may have had a place in some of the cases above noticed, without its being mentioned by the older writers, whose views on the subject of contagion and infection were less precise than those we now adopt. Hospital gangrene is probably the disease alluded to by Horstius in the beginning of the seventeenth century, when he observes, that much contention and wonder had arisen why wounds were so difficult of cure, "Cur hoc Martiali seculo, vulnera fere omnia in pejus ruant, difficulterque curentur;" and he assigns, as the cause of this, a vitiated atmosphere from the sordes of camps, and a cachetic habit of body, "either bilious, or corrupted by the venereal disease."

La Motte seems to be the first author who considers the disease we are now treating of as a species of gangrene, and he speaks of it as an every-day occurrence in the Hôtel Dieu at Paris, "where," says he, "it supervenes upon or accompanies almost all the wounds treated in that hospital, and a great part of the abscesses opened there, on account of the corrupted air which prevails, and which the wounded respire." Since the time of La Motte the disease has been noticed by several of the continental surgeons, under the names of "pourriture d'hôpital," and "La gangrene humide des hôpitaux." In this country, we have many valuable observations upon it, under the various appellations of putrid, contagious, malignant, and gangrenous ulcer, hospital sore, and "hospital gangrene," by which name it is generally known to English surgeons; and I now proceed to notice in succession the peculiar views adopted and the treatment recommended by some of the most distinguished writers upon this subject during the last sixty or seventy years.

Reverting more particularly to the writings of Pouteau, it is to be remarked, that in the second of two memoirs by this author "Sur la Gangrene Humide des Hôpitaux," after describing the local appearances of the disease, he goes on to observe, that the cause of the gangrene acts upon the affected spot by insertion, and upon the whole animal economy by a subsequent reaction, the mode of its propagation being similar to small-pox. He then proceeds to recommend, as a local remedy, the actual cautery; or should the pusillanimity of the patient, or perhaps that of the surgeon, revolt at the cautery, we are to substitute boiling oil, or some medicinal melange susceptible of a heat yet greater than oil. The constitutional fever which accompanies this disease he considers as of a malignant character; and speaks with reserve of the efficacy of bleeding, calling it a feeble resource, and only to be employed in sanguine temperaments. Bark, and other febrifuges, he considers useless; but speaks favourably of emetics and purgatives; and, above all, he strongly recommends the use of camphor. Dussassoy, the successor of Pouteau at the Hôtel Dieu of Lyons, persuaded himself of the great utility of cream of tartar, so as in the first instance to operate as a purgative, and subsequently, to produce its diuretic effects.

Some years subsequent to the publication of Dussassoy in 1788, we have an essay, "Sur la Gangrene Humide des Hôpitaux," by Mureau and Burdin, the latter a surgeon in the French army. These gentlemen attribute this disease, like Dysentery, Hospital, and Jail fever, to the action of putrid miasmata with which the air is surcharged. They proceed to lay down the treatment under two heads, the preventative and the curative. With a view to the first is recommended storax, the acetous or citric acid, and caustic potass applied locally; along with emetics, bark, and wine. These internal remedies are also recommended to fulfil the second or curative indication, together with the local use of powdered bark; which, say they, fulfils a double indication, absorbing the moisture and pus, and giving tone to the part.

In an appendix to Dr. Rollo's Treatise on Diabetes, published in 1797, the hospital gangrene is treated of as "a sore acted upon by a new or overlooked species of matter." The

sores which were thus acted upon under Dr. Rollo's observation, occurred in the artillery hospital at Woolwich, and chiefly amongst the men of the horse brigade, many of whom had sores on their legs from the kicks of horses. "Impressed strongly with the notion that a morbid poison was applied locally to the sore, which, like the venereal poison, had the power of assimilation, as also of being absorbed, producing effects on the system, and a reaction on the sore," Dr. Rollo determined to adopt a local means of treatment. "The oxygenated muriatic acid, and the nitrates of silver and mercury, were the local applications employed; and latterly, the oxymuriatic gas." The former were applied in the form of dilute solutions, by means of lint; and by a due perseverance in their use, the poison and ulcer were destroyed. After the action has taken place, and before a general disposition is formed, it might be possible, Dr. Rollo thinks, to stop its progress by very active topical applications. "We would prefer," says he, "the most active mercurial preparations; and if an actual caustic was to be employed, we should have recourse to the strong nitrous acid." Dr. Rollo, it is to be observed, practised amongst a class of men endowed by nature with good constitutions, selected, perhaps, with more care than the common description of soldiers, and well calculated to resist the progress of such a disease. Accordingly we find that, partly owing to these circumstances, partly owing to the superior accommodation and comfort which the artillery hospital at Woolwich is calculated to afford, and greatly owing to the abilities and active exertions of the surgeon, this disease proved much less destructive amongst the men of the royal artillery than what it has generally done in other hospitals, or on board ships of war.

In the Medicina Nautica, Dr. Trotter has given us some valuable observations on this disease, chiefly in the form of reports made to the author by various naval surgeons. From these it appears, in some instances, to have been connected with a scorbutic diathesis; but its ravages seem to have been most severe in circumstances where scurvy does not usually prevail; and by far the greater number of the naval surgeons are disposed to trace the origin of this disease to some connection with the shore. Thus, Mr. M'Dowal of the Prince of

Wales, remarks "we received on board a number of bad ulcers from Martinique Island; and so alarming was its progress, that on our arrival in the Downs, fifty-six were on our list of ulcers." Mr. Arthur of the Belleisle observes, that "the marines and landsmen who were sent on board to complete her complement, a considerable time after the ship's arrival in England, were as susceptible of the same kind of sore as the oldest part of the ship's company." And we learn from Mr. Caird's account of this ulcer, as it appeared in the Queen Charlotte, from which ship many were sent on shore to the hospital, that "this change of situation did not seem to operate much in their favour." The change in this instance, however, was not very considerable, for the Queen Charlotte had, previously to the appearance of this ulcer, been long in harbour, where the men were living on fresh beef every day, with abundance of vegetables. Dr. Trotter himself observes, with regard to this ulcer, that it has been observed to prevail more in ships in port than at sea, or very shortly after leaving the harbour. "It has never," says he, "assumed the complexion of a scorbutic ulcer, which is distinguished by the dark-coloured fungous mass lying over its surface, termed by the seamen bullock's liver. This, on being removed, is quickly regenerated, and is commonly attended with symptoms of scurvy, such as soft swellings of the legs, spongy gums, and sallow looks. On the contrary, in this ulcer, when the putrid parts separate, the surface is of a light florid colour. The scorbutic sore is seldom painful; our ulcer is attended, at times, with exquisite torment."

In a recent work on traumatic gangrene, by M. Ollivier of Paris, the author questions whether this diease has ever prevailed epidemically in consequence of a general atmospheric cause. But, in small crowded wards, the gangrene may, he thinks, be transmitted from one patient to another through a vitiated atmosphere. Numerous experiments and observations are noticed by Ollivier, as those of MM. Dupin, Richerand, Dupuytren, and Willaume, tending to establish its non-contagious nature; others, as those of MM. Pointe, Danillo, Clerc, Vautier, and Delpech, leading to an opposite conclusion. Dissatisfied with these contradictory results, he deemed it necessary to establish its contagious nature by a direct inoculation, made

with virus taken from its source, and inserted into an individual not exposed to the ordinary epidemic causes which prevail in hospitals; an individual in good health, and altogether independent of every cause which could in any other manner favour the production of the disease.

To ascertain this disputed point, Ollivier determined on inoculating himself, and matter for the purpose was obtained at Ecija. It was taken from a case of the very worst description, and was inserted near the humeral attachment of the deltoid muscle of the right arm, by M. Ganderax, in presence of all the surgeons of the medical staff at Ecija. The author was then in his twenty-first year, of a very nervous constitution, but otherwise in pretty good health. The operation was performed on the 17th October 1810 at six in the morning. During the following day he was on the road from Ecija to Carmona, and felt no inconvenience. On the 19th a vesicle, with a red areola, made its appearance; and by the 22d, the part had assumed all the appearance of the author's second variety of hospital gangrene, when he was induced to interrupt its progress by removing the sloughs, rubbing the surface with nitrate of silver, covering it with the same substance in powder, and dressing it with charpie dipped in camphorated spirit of wine. On the 24th he was induced to take bark, apprehending a constitutional affection from a swelling of the axillary glands. The wound was dressed regularly in the manner before mentioned, and was not cured until the 28th day. "This experiment," says Ollivier, "undoubtedly seems to prove the contagious property of traumatic gangrene. The facts which oppose this conclusion most assuredly depend on some peculiarity of constitution, or some favouring circumstances which enable certain individuals to resist in general every kind of infection."

Several facts which have come to my own knowledge tend to establish the occasional production of gangrenous ulcers by direct inoculation; and of these, one of the most remarkable was stated to me by Deputy-Inspector Marshall. Ulcers of this description prevailed to a great degree in the hospital of a regiment stationed at Feversham in 1806, insomuch that several men had each a limb amputated, and some punished men died. It was at last discovered that all the sores in the hospital were washed with one sponge. The sponge was

destroyed, and this mode of cleaning sores interdicted, after which not a single case of the disease occurred.

While the above observation, as well as others, goes to establish the possibility of communicating this disease by inoculation, it is not impossible, that in wards where hospital gangrene prevails, a deterioration of the atmosphere may exist sufficient to propagate the disease without immediate contact. Professor Brugmans of Leyden has ascertained by an analysis of the air in such wards, that it contains a peculiar animal matter highly disposed to putrefaction, that the quantity of oxygen is diminished and the quantity of azote and carbonic acid proportionally increased, while the presence of sulphuretted hydrogen is also to be detected. That partial deteriorations of the atmosphere occasionally take place, even in the same ward, may be inferred from a circumstance noticed by Dr. Hennen, who remarks that an improvement in the aspect of wounds and ulcers is often observed in military hospitals where means are found to elevate the bedding from the floors of the wards, where the most noxious part of the air, from its comparative weight accumulates. And this has also been noticed by Sir David Dickson as occurring in a hospital ship on the coast of Egypt, where a similar improvement was observed on elevating the patients from the deck.

In the valuable work of Ollivier already noticed, the author attempts to characterise three different varieties of traumatic gangrene, which appear to me to be only different degrees of the same affection, influenced perhaps by the constitution of the individual, by the state or situation of the sore upon which it supervenes, and by the length of time during which that sore may have existed previous to the invasion of the disease. As these subdivisions have not been recognised by some of the most experienced practical writers, I shall content myself with a general description of the characteristic marks of traumatic, or hospital gangrene. In the simplest cases, where the disease supervenes upon a puncture, slight incision, or scratch, it is described by Mr. Blackadder as exhibiting local phenomena very much resembling those which are produced by vaccine inoculation; and he gives a brief account of an accident which happened to himself in dissecting the stump of a patient who died of this disease.

Having punctured himself with the point of his scalpel in one of the fingers, the part became inflamed, a vesicle having a depression in its centre, and containing a watery fluid of a livid colour, formed upon a hard elevated base, the surrounding integuments became tumefied, and extremely sensible to the touch. About the distance of the fourth of an inch from the base of the tumour, a very distinct areola of a bluish-red colour made its appearance, and continued visible for several days. These local appearances were accompanied with general indisposition, headach, nausea, and frequent chilliness, which were relieved by the use of neutral salts, pediluvium, and warm diluents. The inflammation gradually subsided, but the sore had no disposition to heal; it did not enlarge externally, but was disposed to burrow under the integuments. This phagedænic disposition was ultimately got the better of by laying open the sore, and by repeated applications of caustic; but it was two months before a complete cicatrix had formed, and it was upwards of six months before the part had regained the colour of the surrounding integuments.

It is chiefly, however, with the appearances of this disease as supervening upon gun-shot wounds, upon stumps, and upon old suppurating surfaces, that, as military surgeons, we are concerned. The following excellent description of it, by Staff-Surgeon Boggie, will be found in a work on Hospital Gangrene, originally published in the transactions of the Medico-Chirurgical Society of Edinburgh. "When a wound or ulcer is affected with contagious gangrene, it loses its healthy florid appearance, it becomes painful and swollen, and the granulations, which were small and distinct, become flabby, and appear sometimes as if they were distended with air; at other times, vesicles containing a watery-coloured fluid, or bloody serum, have been observed; and the sensation in the sore has been described as resembling the stinging of a gnat. The secretion of pus is suspended, the wound is dry, and covered with a tenacious viscid ash-coloured matter which adheres firmly to the surface. When this morbid state has existed for some time, a discharge takes place of a thin ichorous matter of a very peculiar smell; the pain increases, the edges of the wound are reverted, and in general assume a circular form; an erysipelatous redness surrounds the wound.

and sometimes extends to a great distance, even over a whole limb."

"The neighbouring glands, as those of the axilla or groin, swell, inflame, and sometimes suppurate; febrile symptoms become apparent; the pulse is accelerated, full, and strong; the heat of the surface is much increased; the patient complains of nausea and thirst; the tongue is covered with a whitish or brown crust, and the bowels are in general constipated. The inflammation goes on increasing, the thin ichor continues to be discharged in great quantity, and a thick slough, apparently of coagulated lymph, covers the whole surface of the wound; the fetor becomes intolerable, and the pain quite insupportable. In the last stage there is in general an oozing of blood from the surface of the wound, and not unfrequently distinct hæmorrhage from the corrosion or destruction of the larger blood-vessels. Sphacelus takes place to a greater or less extent; the strength of the patient fails; the pulse sinks; his countenance becomes altered and collapsed; the skin is bedewed with a clammy sweat; and a diarrhœa with hiccup coming on, the scene very soon terminates."

With a view to the treatment of hospital gangrene, a question of much practical importance falls now to be noticed regarding the nature of this febrile affection which we have described. Is it always symptomatic of the local affection? And is it to be cured by checking this malady? Or is the local sore always deteriorated through the medium of the constitution? These important questions have been duly weighed by numerous experienced military and naval surgeons of the present day; and Dr. Boggie conceives, that to decide them we must look to the causes of the disease. Of these there is in many instances obviously a combination, temperature, locality, construction of hospitals, constitution and mode of living of individuals, &c. The causes particularly enumerated by Dr. Boggie are particular states of the atmosphere; inattention to cleanliness; acrid and irritating applications; stimulating food; intemperance; motion or mechanical irritation; and specific contagion. Upon each of these causes some interesting and valuable remarks are given; and he concludes by stating that, in his opinion, either the constitutional or local symptoms may precede, according to the source from

which the attack originates. In the treatment of the fever he depends chiefly upon bleeding and antiphlogistic remedies, which he had the merit of introducing into the hospitals at Bilboa after the battle of Vittoria. He gives three successive monthly returns, shewing a progressive diminution of mortality amongst the wounded, in proportion as the practice of bleeding and the antiphlogistic treatment were more fully adopted. The deaths, a large proportion of which were from hospital gangrene, appear in the first table as 1 to 15 of the number treated, and in the last as 1 to 131. The local treatment consisted of sedative, escharotic, or stimulating applications, according to the appearance of the sore and the stage of its progress.

Dr. Hennen, we find, depends almost solely for the removal of this malady on an improved state of the atmosphere in hospitals where it prevails, or on the dispersion of the sick in quarters, or lodging them in tents. For checking the progress of the accompanying fever in its earlier stages, besides the common evacuations by emetics and purgatives, he concurs with Dr. Boggie in strenuously recommending venesection, from which he observed the best effects. And in adverting to the local treatment he speaks favourably of fermenting cataplasms, levigated charcoal, and other antiseptics.

Mr. Blackadder, who saw much of this disease in the general hospital at Passages in Biscay, contends strenuously for the local character of the affection, and in accordance with this opinion, places his chief dependence on the use of a local remedy—the arsenical solution—the method of applying which to the surface of the sore is minutely detailed in his work.

Mr. Copland Hutchison, in his Surgical Observations, expresses his opinion in favour of the precedence of the local affection; and he has given a translation of the official report of MM. Portal and Deschamps to the National Institute of France, on a Memoir on Hospital Gangrene by Delpech, the late distinguished professor of surgery at Montpelier. Mr. Hutchison has given us also a most valuable series of reports by several surgeons of the Royal Navy, in reply to certain queries addressed to them by the commissioners for sick and

wounded seamen. Although many of these reports are not confined to ulcers bearing the character of hospital gangrene, yet we learn from them this important fact, that a great diminution in the number and intractable character of the ulcers prevalent in the navy has latterly taken place, which is attributed to improvements in the ventilation and cleanliness of the ships; to more advantageous accommodation for the sick; to improved diet, with more regular supplies of vegetables; and to increased professional attention—to which it would seem, from one of the reports, that the naval surgeons were, in some measure, roused in consequence of the trial by a court-martial of the surgeon of the Salvador del Mundo, on charges connected with the prevalence of ulcers in his ship. With regard to what has long been known in the navy as the malignant ulcer, its more successful management is very generally attributed to the adoption of the antiphlogistic mode of treatment; and the naval surgeons almost uniformly concur in assigning the merit of this improvement to Dr. Baird, the inspector of naval hospitals.

My learned predecessor Dr. Thomson, who has given an excellent summary of the reports of others upon this subject, along with some observations of his own, in his Lectures on Inflammation, again adverts to it in his Observations on the Military Hospitals in Belgium; and remarks that in the cases in which he had seen this disease occur in Great Britain it appeared to be of a contagious nature; but he is doubtful whether it was ever communicated from one patient to another in Belgium, and is rather inclined to believe that it was endemial, depending on the same causes as the fever of the country.

On the subject of hospital gangrene, I was favoured with some remarks by Sir James M'Grigor, in a letter written soon after the publication of the first edition of this work. He considers the disease as sometimes connected with unhealthy sites of hospitals, and sometimes with unhealthiness of the subjects:—"I have," says Sir James, "witnessed disorder of the *primæ viæ* being the principal cause in most of the cases that occurred in one situation, and an emetic the remedy which arrested it, followed by the exhibition of bark." The occurrence of this disease a few years ago in the St. Louis Hospital

at Paris, was, I believe, attributed to the unhealthy emanations from Mountfaçon, where there is a large slaughter-house, and often an accumulation of most offensive animal refuse.

From what has been said in this and the preceding section, it may be inferred that between hospital gangrene and ulcers akin to it, we have not those decided and well-marked diagnostics which it would be desirable to possess. The term gangrene has been occasionally, nay frequently, applied to ulcers presenting few or none of the phenomena of that disease; and, according to Dr. Boggie's view of this subject, the term "hospital" gangrene is altogether inappropriate as regards its exclusive origin. In numerous papers upon ulcers, to be found in the "Transactions of the Medical and Physical Society of Calcutta," the terms scorbutic, sloughing, phagedænic, malignant ulcer, and hospital gangrene, are used, I would say, almost promiscuously, to denominate ulcers prevalent in the same or similar localities, and between which there seems to be no well established diagnosis. This leads me to observe that in the treatment of ulcers, more useful practical distinctions are to be drawn from the circumstances under which they prevail, than from the phenomena which they present. In so far as names can be of any importance, I should, with reference to the numerous designations mentioned above, be disposed to include in one class the scorbutic, sloughing, and gangrenous ulcers; and in another the hospital gangrene, phagedænic, and malignant ulcers.

One of the most important distinctions between the scorbutic and malignant ulcer is, that the former is incident to seamen or soldiers whose constitutions have been impaired by long confinement on ship-board and unwholesome diet, or to sepoys and lascars, whose vital powers are comparatively feeble; and that it is most successfully combated by improved diet, relaxation on shore, or a change of locality; while the other, whether termed hospital gangrene or malignant ulcer, often appears as an inflammatory disease, and is then most successfully treated by bleeding and antiphlogistic remedies.

Such appear to me to be the legitimate inferences from the history and treatment of hospital gangrene, as detailed in the writings of the most experienced surgeons; and to the summary which has now been given my own observation does not enable

me to make any important addition. When a pupil at the Royal Infirmary here, nearly fifty years ago, there were some cases of ill-conditioned sores which were spoken of as cases of hospital gangrene; but at this distance of time I do not feel myself entitled to speak with confidence as to their appearance or treatment. On several subsequent occasions, sores, bearing many of the characteristics of hospital gangrene, have fallen under my notice, particularly from punishments; and of these one of the most remarkable was that of a soldier of the 3d battalion of the Royals, who was punished at Bexhill in 1807. He was one of seventeen punished men who lay in the same ward, in several of whom the sores had assumed a malignant appearance; but in the individual above alluded to, although he had not received more than three hundred lashes—much less than was inflicted on many soldiers in those days—the sloughing extended so far as to lay bare the spinous processes of the vertebræ, from his neck to his loins. The case was looked upon by the surgeon of the regiment and myself as so completely hopeless, that, anticipating the man's death and our own trial, we requested the deputy-inspector of the district to visit the patient, with a view to his giving evidence as to the correctness of our professional treatment. The propriety of that treatment subsequent events have made me very much disposed to question, inasmuch as it was everything but antiphlogistic. Here, and in some other cases, the treatment was perhaps more adapted to the name than to the nature of the disease. The case, however, took a favourable turn, and the patient completely recovered. Of late years we have had several visitations of this vexatious occurrence in the surgical wards of the Royal Infirmary—both the local affection and the constitutional fever appearing to run a course of from a week to ten or fourteen days, little influenced by any treatment whatever.

Of local remedies, every form and variety have been used in this disease, from the actual cautery down to the application of dry lint. The cautery, first employed by Pouteau, Dussassoy, and Cartier, has been more recently recommended by Delpech, who states, that by this means he treated successfully a hundred and fifty soldiers affected with hospital gangrene, after the siege of Pampeluna. The efficacy of the lunar caustic

is confidently spoken of by Ollivier. The undiluted nitric acid is recommended by Mr. Wellbank, is favourably noticed in a manuscript report, which was furnished to me by Mr. Stevenson of the Madras army, and was many years ago recommended by Mr. Guthrie as noticed by Delpech. The arsenical solution is recommended by Mr. Blackadder, and the red oxide of mercury by Dr. Boggie; while Professor Brugmans and Dr. Hennen express little confidence in local remedies, and rest their hopes chiefly on the means of improving the air of hospitals, and regulating the excess of the symptomatic fever. The local remedies above mentioned are so far consistent with each other that they are all of a caustic or escharotic nature; and I am naturally inclined to place most confidence in the most powerful—the actual cautery—looking upon the others as more or less efficient in proportion as their powers approach to that of the cautery. In the treatment of the constitutional fever, so often of an inflammatory character, blood-letting, as recommended by Dr. Boggie and Dr. Hennan, is the only remedy in which I am disposed to place much confidence, particularly in the early stages of the disease, and amongst young and vigorous soldiers, who have not been long confined by their wounds, or debilitated by the fatigues of a protracted campaign. The necessity of attention to thorough ventilation and to perfect cleanliness is acknowledged by all, even by Mr. Blackadder, the most strenuous advocate for the local character of the disease; and when these essential points cannot be otherwise attained, I am disposed, with Dr. Hennen and Mr. Bell, to recommend the breaking up of the hospital and the temporary dispersion of the sick.

WOUNDS.

There is no department of surgery in which the science and dexterity of the present day may be more favourably contrasted with the rudeness and cruelty of former times, than in the treatment of wounds. Instead of permitting nature to follow the simplest and shortest method of cure, by approximat-

ing the lips of a wound, and allowing them to adhere, surgeons were formerly skilled in every contrivance which could possibly prevent the healing of a wound. It was stuffed with dressings, tents, and tubes; and was only permitted to heal after a lapse of weeks or of months, when it had been duly purged of its "foul humours," and had been methodically conducted through the stages of digestion, mundification, incarnation, and cicatrization. But before prosecuting this comparison farther, or entering into any minute detail of the present method of treatment in wounds, it will be well to advert to a few general circumstances to be borne in mind in the management of the wounded.

It will be admitted that medical and surgical assistance are of most value when most promptly applied; and it is proved, by the experience of army surgeons, that wherever operations are to be performed on the wounded, pain and suffering are saved, and even the chances of recovery improved, by these operations being performed without loss of time. Wherever it can be conveniently done, particularly at sieges, one or more places of temporary rendezvous should be appointed, where the first dressings may be applied, and the primary operations performed. From this the wounded are to be conveyed to hospitals in the rear—those who can walk carefully selected from those who require to be carried; and in the execution of this duty, the young and inexperienced surgeon will have need of all his discrimination; for, it has been truly observed, "that the most clamorous and troublesome among the wounded in the field, or before the walls of a besieged town, are generally the worst characters in the army, and often the most slightly injured."

When placed in hospital, arranged and classed as far as circumstances will permit, the labours of the medical officer will be greatly abridged, by having a tray furnished with dressings ready prepared, and some of the most common formulæ of medicines. Upon all occasions, and under all circumstances, the utmost attention should be paid to the regular dressing of wounds, and more especially to the enforcement of cleanliness in every respect. These are circumstances less equivocal in their operation, and the salutary effects of which are better established than the virtues of any medicinal appli-

cation whatever. In regulating the diet of wounded patients, too much caution cannot be exercised, particularly in cases of wounds of the head. Independently of the abuse of food, daily experience shows that even its moderate use is often detrimental. It has not unfrequently happened that patients who have undergone great privations, combined with exposure to cold, have manifested no dangerous symptoms until taken into hospitals, where their wants have been supplied; and many soldiers have lost their lives, by a childish facility of the younger surgeons allowing them what are termed extras—a frequent cause of protracted illness, and a source of endless abuse in hospitals.

Various definitions have been given of a wound, and various objections have been made to all of them. It is therefore perhaps a hopeless task to attempt a definition at once sufficiently concise, and at the same time so comprehensive, as to embrace every circumstance in accidents so complicated; but by those who are more eager to acquire practical information than to quarrel with the imperfection of language, the following definition will perhaps be received as sufficient for every useful purpose:—"A recent solution of continuity, occasioned by external violence, and extending through one or more textures."

Such solutions of continuity may be occasioned by the mechanical action of all foreign bodies, which are harder than the texture of our organs; and as the number of such bodies is infinite, and the texture and functions of parts exposed to injury various, it will readily be understood, that an endless difference exists in the nature, the extent, and the danger of wounds. To facilitate the study of this branch of surgery, systematic authors have, from the earliest times, adopted various classifications of wounds. An anxiety to predict the ultimate issue of these injuries led to one of the earliest, but at the same time one of the most imperfect divisions of wounds—into those which are mortal and those which are not. In the writings of Hippocrates we find a methodical detail of such wounds as he considered mortal; and he pronounces the inevitable fatality of all wounds in the brain, the spinal marrow, the heart, the liver, the diaphragm, and the bladder; and from his erroneous opinion of the mortality of wounds

of the last-mentioned viscus, he framed the celebrated oath which was administered to his disciples against cutting for the stone. Celsus has been somewhat more precise in his enumeration of mortal wounds, but, for the most part, he coincides with Hippocrates in his opinions upon this subject. In more recent times a detailed enumeration of wounds has been given, embracing the causes upon which their fatality depends. Thus, mortal wounds have been divided into "those in which the nervous fluid is interrupted in its course to the heart; wounds inflicted in parts where applications cannot be made to restrain the bleeding, as deep wounds of the lungs, &c.; wounds which interrupt respiration or circulation, as those of the larynx, the bronchiæ, the diaphragm, the heart, and those penetrating both cavities of the thorax; and, lastly, such wounds as deprive the body of nutrition, by preventing the passage of food into the stomach, the preparation of chyle, and the conveyance of it into the blood."

While many of the general principles adopted in the foregoing classifications are undeniable, the imperfection of their particular details is a matter of every-day observation. There is scarcely one of the specific wounds enumerated by the earlier writers as mortal, from which individuals have not occasionally recovered. In speaking of wounds of the head, we shall have occasion to notice cases in which the brain has, either by accident or design, been exposed to a great extent, and where it has been penetrated by balls or other missiles, almost to its centre; where large portions of this important organ have been removed, and where the patient has nevertheless survived, and has, in some instances, been enabled to resume the active duties of a soldier. In treating of injuries of the chest, cases will be noticed in which the lungs have been wounded by pointed weapons, musket balls, splinters of bone from a fractured rib or clavicle, and where the individuals have nevertheless been restored to health. There are also several cases on record where patients have long survived wounds of the heart; and one case is well authenticated, in which a musket ball was lodged in the substance of the heart itself; whence it was cut out after the patient's death, which took place at the interval of six years, from disease altogether unconnected with the wound. In treating of wounds of the

abdomen, we shall find that this cavity has been penetrated in every direction, both by pointed weapons and musket balls, that every important viscus contained in it has been wounded without fatal effects, and that balls have been lodged in this cavity during a large portion of a long life. In discussing the subject of wounds of the extremities, we shall have occasion to advert to cases in which the most formidable lesions, both in the soft parts and in the bones, have been repaired; above all, we shall here have occasion to admire the wonderful provisions of Nature in those remarkable cases, of which many are on record, where limbs have been torn from the trunk without an alarming, much less a fatal hæmorrhage.

Such remarkable cases induce us to circumscribe very much the list of mortal wounds. On the other hand, we sometimes see fatal consequences originate from accidents apparently trifling. A puncture almost imperceptible, received in the most remote part of an extremity, at a distance from any vital organ, will sometimes be followed by tetanus with all its horrors, and will terminate in death. In allusion to wounds of the most limited extent, which are sometimes received in the prosecution of anatomical research, a recent writer observes, "that scarcely a winter passes over without some sacrifice of life to the perilous cause which we espouse."

With a view to legal investigations, various arrangements of wounds have been adopted, having reference to the phenomena which they present, the consequences which naturally follow them, or the morbid appearances which they leave behind; and upon these principles Chaussier has constructed a "Table synoptique des Blessures," embracing many important circumstances. Of the artificial arrangements of wounds usually found in books of surgery, lawyers have sometimes taken advantage, and have contended, that wherever a person died of a wound not belonging to the mortal class, it must have been from misconduct, or *ex malo regimine*. But legal investigations have, at the same time, afforded the best possible proof of the insufficiency of all such arrangements. Thus, in a case alluded to by Baron Hume, we find three physicians and two surgeons swearing, that by "the rules of their prognostics," the wounds received by a person named Houston were mortal; whereas Houston was alive, and was

prosecutor in the very case in which these gentlemen deponed to this effect. As military surgeons, however, our chief interest in ascertaining the mortality of wounds, is to prevent us, on the one hand, abandoning our wounded comrades, where our efforts might be useful to them ; and, on the other, to prevent our wasting time in unavailing efforts to benefit those whose injuries are beyond the reach of human aid. All must admire the correct view which the gallant Lord Nelson took of this subject in his dying moments. Sensible that he had received a mortal wound, he insisted on his surgeon foregoing his attention to him, and offering his assistance to those to whom such assistance might be useful. The correct classification of wounds received in battle into slight, severe, dangerous, &c., is a subject which has not always received that attention which it appears to me to demand. An accurate classification of these injuries is a matter of grave importance to individuals as bearing on their rates of pension or claims to promotion, and cannot be too carefully or too conscientiously conducted by the Military and Naval Surgeon. This subject has most properly been brought under the notice of Parliament during the present session by Colonel Knox, who comments upon the hardship of a case where a man, blessed with a good constitution, makes perhaps an unexpected recovery after a severe and dangerous wound ; compared with that of another who, with an inferior constitution, makes an imperfect recovery from even a slight wound. The honourable member concludes, " that the return made on the field of action ought to be final, and that on the return then made, the rate of payment should depend."

From the depth to which wounds extend, they are denominated superficial, muscular, and penetrating wounds, in proportion as they affect the integuments, the muscular parts, or penetrate the great cavities. From the nature of the offending weapon, wounds are characterised as incised, punctured, lacerated, and contused. Those more particularly incident to the soldier, are sabre, bayonet, and gunshot wounds ; or, to adopt the language of William Clowes, " wounds made with gunshot, sword, halberde, pike, launce, or such other." Wounds are again subdivided by systematic authors, according to their site, into wounds of the head, face, neck, thorax,

abdomen, and extremities; and again, into wounds of the different organs contained in the great cavities, which we shall have occasion to consider in detail, as they affect the principal viscera.

Incised Wounds of any considerable extent are characterised by hæmorrhage, pain, and retraction of the lips of the wound. The hæmorrhage, proceeding chiefly from the arterial vessels supplying the wounded part, depends much, of course, upon the size and activity of these vessels. It is worthy of remark, however, that in simple incised wounds, the hæmorrhage is generally more profuse than from lacerated or contused wounds of the same extent. The pain attendant upon wounds depends upon the natural sensibility of the part, and is the direct consequence of the injury done to its nerves. Thus, in wounds of the skin generally, and in some parts of it particularly, where the nerves are minutely subdivided, and exquisitely sensible, the pain is acute, although less so in simple incised than in lacerated and contused wounds. The degree of retraction of the lips of a wound varies according to its situation and extent. In wounds which merely penetrate the skin, or the skin and cellular membrane, the retraction is not in general very considerable. In muscular wounds, the extent of the retraction is also inconsiderable, if the wound follows the direction of the muscular fibres. If these fibres are penetrated obliquely, the retraction is greater; and if the fibres are divided transversely, the separation of the lips of the wound is still farther increased. The prognosis, in cases of incised wounds, although, as a general rule, it may be considered more favourable than in other descriptions of wounds, is yet modified by many contingent circumstances. Deep wounds are more dangerous and difficult of cure than superficial wounds of even a greater extent; and the danger of wounds is greatly increased by various complications, such as the division of large blood-vessels, giving rise to profuse hæmorrhage; the lesion of nerves, tendons, and aponeuroses, giving rise to spasms and convulsions; the division of excretory ducts, and nutritious canals leading to the effusion of various fluids; and the opening of the great cavities, making room for the protrusion of the different viscera.

Although the gigantic blows by which bodies are dismem-

bered, and limbs severed from the trunk, are but a rare occurrence in modern warfare, yet very severe and dangerous wounds are often inflicted by the sabre; and it is about the head, the neck, the shoulders, and upper part of the trunk, that these wounds are chiefly to be met with. By such wounds, extensive portions of the cranium are occasionally detached along with the scalp, and in these cases reunion sometimes takes place in a manner that could scarcely be expected; indeed it is not by the injury of bones that sabre wounds are most destructive; but by means of the sabre, joints are occasionally laid open, their appendages destroyed, the tendons divided, and such extensive mischief occasioned, as to endanger the loss of a limb, and very frequently to bring the patient's life into hazard. From our being able in general to ascertain at once the extent of the injury, our prognosis in sabre wounds becomes less doubtful, and the indications of cure less complicated. These indications are the staying of the hæmorrhage, the removal of foreign bodies, and the approximation of the edges of the wound. This last indication, applicable both to limited and extensive wounds, is followed with a view to promote the process of adhesion, or, what has been termed by surgeons, union by the first intention. This process has already been cursorily adverted to, under the term of adhesive inflammation. It was observed that the knowledge of adhesion, and of the means of promoting it, is the most essential step which has ever been made in the treatment of wounds; and it is not a little wonderful that the world should have required, as it were, to be cheated into this safe and easy method of cure. Such however is the fact; for the practice of adhesion was introduced into surgery in conjunction with sympathetic powders, salves, and washes; in some instances, with loathsome and disgusting practices; and in others, with charms and incantations, certainly the most harmless of all its accompaniments, and the least likely to interfere with its salutary effects.

In the splendid work of Mr. John Bell on the "Principles of Surgery," we have a most interesting and humorous account of the early practice of adhesion in the treatment of wounds; and from him we learn that it is little more than sixty or seventy years since surgeons began to entertain any settled or

rational opinions on the subject of adhesion, or to see the extent to which it might be applied in the treatment of wounds. Previously to this period they had no motive for sparing the integuments in operation; nor did they know how advantageously these might be used in expediting the cure. If they extirpated a tumour, they cut away along with it all the surrounding skin. If they had occasion to trepan the skull, they uniformly preceded it by the savage operation of scalping. In performing their amputations, they cut by one stroke down to the bone; and even after the flap operation was introduced, the flaps, instead of being brought into contact, were dressed as separate sores. Under such treatment, exfoliation of the bone was a common, almost an invariable occurrence; and much art was employed to promote it. Whenever a bone was laid bare, they believed that it must of necessity exfoliate; and until this exfoliation took place, they would not permit the wound to heal. "And so," says Mr. Bell, "they made good their opinions by their practice." The reported cures by the process of adhesion were at first treated as fabulous. The celebrated Irish surgeon O'Halloran, who wrote in 1765, observes, that "these tales of adhesion were told with more confidence than veracity. Healing by inosculation, by the first intention by immediate coalescence, without suppuration, is merely chimerical, and opposite to the rules of nature." "I would ask," says he, "the most ignorant tyro in our profession, whether he ever saw or heard even of a wound, though no more than one inch long, united in so short a time." And yet did this very surgeon live to see the doctrine of adhesion followed up in amputations, by a practice calculated to promote it, and perfect adhesions occasionally taking place in a few days' time.

By a moderate and rational application of this practice, surgery has, within the last half century, reaped incalculable advantages, particularly in the treatment of wounds. The well-known practice of transplanting teeth, the experiment of Mr. Hunter, in which he transferred the spur of a cock from his leg to his comb, and various other well authenticated facts, convince us of the occasional success of attempts to promote union, in circumstances the most extraordinary, and ought to render us less sceptical as to many cases upon record, from

those of Taliacotius and Garengeot, down to those of a more recent date. Of these I have detailed several in the 47th volume of the Edinburgh Medical Journal, and others are detailed in an Essay by Baron Percy, in the "Journal de Médecine et Chirurgie Militaire," &c., on the following question:—"Une partie vivante, ayant, été entièrement séparée du système animal est elle susceptible de s'y réunir?"

The very frequent success which attends the endeavour to unite a part which retains only a slight connection with the living system, has led to several recent and successful operations for restoring deficiencies in the nose, the lips, the palate, and urethra; and of this disposition of living cut surfaces to grow together, surgeons have naturally availed themselves in the treatment of wounds. It is wonderful with what celerity union by the first intention is sometimes accomplished under favourable circumstances. The large wound made in the operation of amputation is occasionally united in the course of three days, excepting at those points where the ligatures are situated.

When the two sides of a wound have been brought together before the oozing of blood has completely ceased, Mr. Hunter conceived that the blood itself became the first bond of union. All practical surgeons, however, now admit, that the presence of any considerable quantity of blood between the lips of a wound is more likely to prevent than to promote reunion—a process which is accomplished by the effusion of coagulable lymph, and the subsequent restoration of a vascular and nervous intercourse between the opposite surfaces of the wound in a manner which we cannot very distinctly perceive. Whether this coagulating lymph issues from the half-closed mouths of the blood-vessels, or from the opened cells of the cellular membrane, Mr. Hunter found it difficult to determine. And as this is a point which, if determined, could lead to no practical change in the treatment of wounds, it seems to me unnecessary to enlarge upon the subject. Many of the minute and successive steps of the process are imperceptible to our senses, and consequently are, in some degree, matter of conjecture. But, whatever shades of difference in opinion may exist amongst writers upon the subject of adhesion or union by the first intention, there is no important difference amongst practical sur-

geons as to the most effectual means of promoting it; and there is no difference amongst the surgeons of this country as to the propriety of attempting the cure of almost all wounds by approximating their lips, and thereby promoting adhesion. This property in living parts of inosculating and uniting again is indeed so perfect, that in certain cases we may depend upon it with confidence. And it is thus that in wounds we save much pain, prevent a large suppuration, a great waste of parts, and limit the scar to a narrow and almost invisible line—these "will be allowed to be improvements while human nature shall remain sensible of pain, while scars shall be thought deformities, or confinement be deemed irksome."

In those incised wounds to which the soldier and sailor are more particularly exposed, the sabre or cutlass inflicting the wound is withdrawn by the hand which guided it; and our only object, after staying the hæmorrhage, is to bring the recently divided surfaces into accurate contact, and to retain them in this position so as to favour reunion. Even when a perfect approximation of the opposite surfaces cannot be effected, it still becomes an object to bring them as nearly in contact as circumstances will admit. This diminishes the extent of the effort which nature is called upon to make for the repair of the injury, and proportionally lessens the constitutional irritation; it makes a more seemly, a less extensive, and, above all, a firmer cicatrix; greatly accelerates the cure, and, of course, diminishes the time during which the patient is confined to hospital. This is a consideration of the very utmost importance, particularly after every great action, when the hospitals are necessarily crowded with wounded—when hospital gangrene is liable to occur—when the constitution of every individual must suffer more or less by confinement, his convalescence be rendered proportionally more tedious, and the army be deprived for a longer time of his services. Many of the continental surgeons are of opinion that this practice of attempting the cure of wounds by the first intention, so general amongst the English surgeons, is in many cases less advantageous than the mode of cure by granulation and cicatrization, more frequently adopted by the French. But, even allowing that the doctrine of the French writers upon this subject were applicable in its fullest extent to the practice of

civil life, yet the considerations above stated—humanity to the wounded, and a due regard to the interests of the public service—would sometimes compel the military surgeon to act upon different views.

To place the parts in a state the most favourable for immediate reunion, our attention is to be directed to the position of the wounded part, which should always be such as to enable us to keep the edges of the wound in contact with the least possible coercion. This, according to circumstances, may be accomplished either by the relaxation or extension of the muscles as the direction of the wound crosses or runs parallel to the muscular fibres. In wounds of the scalp we can effect little or nothing by any change of position in the head; but here, fortunately, in simple incised wounds, the parts, when once replaced, are not difficult to retain in their proper position. In transverse wounds of the neck, or of the trunk, and in transverse wounds of the extremities, much may be effected by relaxing the muscles implicated in the wound; and our attention to the position of the limb is more especially necessary in the treatment of transverse wounds, because we cannot have in them the same assistance from bandaging as we may have in the treatment of wounds extending longitudinally in the course of the limb. In studying the best position for a wounded limb, the general rule is to place it in that situation in which it would be placed by the contraction of the wounded muscle. Thus it is obvious that in deep transverse wounds on the fore part of the upper and back part of the lower extremity, we can most readily approximate the divided surfaces by bending the limb; and *vice versa* in transverse wounds on the back part of the upper and fore part of the lower extremity, the parts are most readily approximated by extending the limb.

Having gained every thing possible by a due attention to the position of the limb, our next consideration is, the most eligible means of retaining the edges of the wound in immediate proximity. This, in a large proportion of cases, may be accomplished by straps of adhesive plaster, from three-quarters of an inch to an inch in breadth, and of such a length as to enable them to retain a sufficient hold of the surrounding surface—the length being proportioned to the depth of the wound,

and to the tendency which its edges may have to retraction. It is to be observed, however, that the adhesive straps operate almost exclusively on the integuments, and in vascular parts, when much oozing is to be expected from the divided vessels, this is apt to accumulate between the lips of the wound, the straps are liable to be detached by it, and the adhesive process frustrated. This has led to a practice frequently followed of placing a compress on either side of the wound, or of simply bringing its edges together, in the first instance, by one or more stitches; and delaying the accurate and complete closure of the wound for some hours, until the oozing has ceased, and the risk of secondary hæmorrhage is in some measure over. In longitudinal cuts on the extremities, it is not advisable to surround the entire circumference of the limb with adhesive straps, as is often done with advantage in the case of ulcers; in the former case, the sudden infliction of the injury, and the vigour of the constitution sustaining it, often lead to a degree of inflammation and swelling, which would be greatly aggravated by the complete enclosure of the limb in adhesive straps; while in ulcers of long standing, on the contrary, when a deficiency of action exists, the support afforded and the excitement produced by the adhesive strap are highly conducive to the cure. For all wounds of considerable extent the straps heretofore in common use are those composed of the emplastrum adhæsivum of the pharmacopœias, spread upon linen; and my own experience does not lead me to offer any important objection to its use, although I have sometimes been inclined to think that the irritation of the resinous matter which enters into its composition, and the complete obstruction of the pores of the skin by the plaster, have a tendency to excite cutaneous or erysipelatous inflammation. As a substitute for the common adhesive strap, slips of ribbon, or of linen, dipped in a strong alcoholic solution of isinglass, were at one time extensively and successfully used by Mr. Liston in the Royal Infirmary here.

The next means employed for retaining the surfaces of incised wounds in contact is the use of sutures. This practice amongst the older surgeons was executed in a variety of fanciful ways; hence the twisted, the interrupted, the quilled, the glover's, the herring-bone, and many different species of

sutures. Some of them, however, while they were well adapted to the purposes of the glover, the shoemaker, the saddler, or other artists, operating upon dead animal matter, were but ill calculated to be transferred to the living system. Here the reunion of parts depends upon a regulated degree of inflammation, and there can be no doubt that the abuse of sutures in former days was one of the principal means which frustrated the purposes they were intended to serve, by exciting such a degree of inflammation as necessarily terminated in suppuration. One of the first surgeons whose eyes were opened to this mischievous effect of sutures, was M. Pibrac, a member of the French Academy of Surgery—in the memoirs of which body will be found a paper by this gentleman, condemning very generally the use of sutures, and instancing particularly wounds of the lower belly, of the tongue, of the throat, of the tendons, cases of hare-lip, and various other wounds, in which cures were effected by the use of appropriate bandages without the aid of sutures. M. Pibrac concludes his observations on this subject by asking the following queries:—"What practice would the advocates for sutures adopt, were they necessitated, as they often are, to cut the ligatures and remove them? or were they to find, as is often the case, that the ligatures had made their way through the lips of the wound, so as to leave them gaping?"—"they would never," says he, "think of introducing new sutures, but would have recourse to a bandage in order to unite the wound." Undoubtedly they might do so. But this mode of arguing against a practice from its abuse, or from its being employed under unfavourable circumstances, which is by far too common in medicine, is no sufficient proof of its inutility.

Although M. Pibrac, and M. Louis, another eminent French surgeon, who also reprobated the use of sutures, have given us many instances of cures effected without them, it would be no difficult matter to produce an equal, or a greater number of cases of wounds, in which, in the opinion of judges as competent as these eminent Frenchmen, sutures have been esteemed of the utmost importance. Much depends upon the irritability of the wounded part, much upon the natural habit of the patient, and much upon his time of life. It will

readily be understood that in parts endowed with acute sensibility, and in vigorous and inflammatory habits, it will be prudent to guard against the additional excitement which numerous stitches must necessarily occasion, and to trust the reunion of the wound to the effects of position, plaster, and bandage; while, on the other hand, in parts naturally lax, in less irritable habits, and in advanced life, the additional excitement occasioned by the introduction of sutures is rather conducive to the cure, by promoting the necessary adhesive inflammation. And as far as my own experience enables me to offer an opinion upon this point, I am rather disposed to extend than to diminish the number of cases in which sutures are considered to be admissible.

Of all the various forms of sutures, upon the description of which our predecessors dwelt with so much complacency, and of which formal representations are to be seen in the plates of Heister, Benjamin, and John Bell, and various other writers, two only are now in common use; these are the twisted and the interrupted suture. The former is accomplished by passing a straight needle, or a silver pin, transversely through the lips of the wound; and then twisting a thread round it, so as to retain the lips of the wound in very accurate apposition. This is a form of suture more extensively applicable than what is generally thought. Its application indeed, in wounds extending transversely either across the trunk or extremities is difficult; but in many longitudinal wounds of the same parts it may with great propriety be employed. It has the advantage of preventing the lips of the wound from moving longitudinally upon each other. The points being once brought into contact must necessarily remain in the most accurate apposition; and no slipping or gliding of the edges past each other can here take place. This is a suture with which military surgeons particularly should make themselves familiar, from the ease with which it can in most cases be put in practice. A common sewing needle, or even a well-tinned pin, and a thread are to be found in almost every situation; and with these the twisted suture may be always effected. It is every day executed with a pin and a few horse hairs, in securing the wound made by the fleam in the necks of horses for the purpose of blood-

letting. This suture is found particularly useful in all wounds of the lips, whether accidental or intentional, as in the operation for hare-lip, and has been so commonly employed in the latter as to acquire the name of the hare-lip suture.

The interrupted suture is more applicable to transverse wounds than the twisted suture. It is also applicable to wounds of a greater depth; and is accomplished by passing a curved needle armed with a ligature through the lips of the wound, and tying the ligature over the line of the incision. The rule laid down by some systematic writers is, in entering the needle, to keep as far distant from the edges as the wound is in depth; to place the stitches at about an inch distant from each other, and to secure the intermediate spaces with straps of adhesive plaster. Some of these directions, drawn perhaps from the practice of surgery in civil life, are but little adapted to the formidable wounds which occasionally come under the care of the military surgeon; and his object should be to study how he can best attain his purpose, without being fettered by a reference to the number of lines or inches between his sutures, or their distance from the edges of the wound.

The only remaining means of expediting the reunion of incised wounds which remains to be considered, is the use of bandages. In the form and application of these, surgeons have, at different times, exercised as much fancy as in the form of sutures. In justification of this, however, it is to be observed, that the purposes which bandages are calculated to effect, are more varied than those to which sutures are adapted. In ancient times, we find surgeons talking of an expelling, a propelling, a defensive, and several other bandages; and, in the preface to the treatise of Galen upon this subject, we find the following methodical enumeration of the properties of the roller:—"Efficit enim ut quæ abscesserunt propellantur, hiantia conjungantur, perversia dirigantur, atque omnia contraria prestantur." Although all these things are to be effected by a careful and skilful application of the roller, yet it is only with that property by which "hiantia conjungantur," only with its property as a uniting, or what was formerly termed an incarning bandage, that we are at present concerned. For this purpose it is sometimes employed in the

form of a double-headed roller, having a slit in the centre, which slit being placed over the wound, one of the heads is passed through it, and both ends of the roller being pulled tight, the edges of the wound are approximated and retained in this situation. It is obvious, that wherever this bandage can be applied with effect, it must have a very powerful influence in fulfilling the intention with which it is employed; it is equally obvious, however, that its application is very much limited to the case of wounds extending longitudinally in the course of the trunk or limbs, and in such cases the edges of the wound having little tendency to retract, there can be no necessity for having recourse to a contrivance in any degree complicated for retaining them in contact. This form of roller has therefore, in this country at least, gradually given place to the common single-headed roller, or the eighteen-tailed bandage, either of which are capable of effecting all that bandaging can effect in the cure of recent wounds.

In dressing wounds of the head, and those extending transversely across the trunk or extremities, bandages are employed chiefly with a view of retaining the dressings; and hence it is obvious that the form and size of the bandage must vary according to the direction, the extent, and nature of the wound. The due application of bandages can only be learned from experience; and although there are many cases in surgery, particularly cases of sinous ulcers, in which a bandage artfully applied is of essential service in promoting the cure, recent wounds can scarcely be considered as cases which are to be greatly benefited by this means. Nothing indeed can be more preposterous than applying bandages to such wounds with immoderate tightness, for if the bandage be tight on its first application, a dangerous constriction of the limb must follow, when the swelling arising from the wound has come on.

These are the chief objects of attention in the first dressing of wounds, and some of the steps to which I have now adverted—the securing of blood-vessels, and the stitching of wounds—fall to be performed once for all; others, the application of plasters and bandages, are to be renewed from time to time, more or less frequently, according to the profusion of the discharge, the heat of the atmosphere, the feelings of the patient, or other accidental circumstances. When no untoward

occurrence takes place, the first dressings need seldom be disturbed in a shorter period than from three to five days, and where the feelings of the patient, the swelling and tension of the parts contiguous to a wound, or the occurrence of an offensive discharge from it, do not call upon us to interfere, the dressings may be left undisturbed until the wound be completely healed. Every surgeon must have seen the advantage of such a practice in clean cuts about the fingers, from the common accidents of civil life; and for the extension of this practice we have very ample authority, both of old and recent date, from the time of Magatus down to our own day, in which we have instances recorded by Sir Astley Cooper, of those formidable wounds which occur in compound luxations of the ankle joint healed by simply covering them with pledgets of lint soaked in blood, and leaving them undisturbed.

In proceeding to the dressing of wounds, the first point upon which it is necessary to caution the young surgeon, is the idle and injurious practice of probing wounds without any definite object in view, and thereby adding to the sufferings of his patient, without increasing his own information. "We ought never to probe a wound where probing can be of no use, and should be contented to remain ignorant of those things which, if known, could only gratify an idle curiosity." In cases where much time is likely to be occupied in dressing a wound, it is an object worthy of attention to study in what position the patient may be most advantageously placed, in which every necessary examination of the wound may be most easily effected, and in which the old dressings may be removed, and the new ones applied with the least pain to the patient, and the least inconvenience to the surgeon. As a preliminary step to the removal of the dressings, it is often necessary to soften them by the repeated, or continued application of warm water; and this becomes particularly necessary, when, in consequence of the discharge of blood, or other matter from the wound, the dressings are stiffened and glued together, or adherent to the subjacent skin, so as, if abruptly removed, to occasion unnecessary pain, and to endanger the premature removal of the ligatures.

Where wounds have been dressed with straps of adhesive

plaster—a practice less common than formerly—the propriety of raising both extremities of the strap, and pulling towards the centre, so that the part covering the line of the wound may be the part last disengaged, is obvious. By a contrary procedure, or by raising the strap successively from the one end to the other, we should inevitably disturb the process of reunion, and lacerate the tender adhesions already formed. In dressing wounds we should make a point of having everything in readiness, so that no delay may occur by which the wound may be unnecessarily exposed. The patient should be as soon as possible restored to that state of tranquillity and repose which are so conducive, indeed so necessary, to his cure.

The foregoing remarks are chiefly applicable to wounds when treated with the hope of procuring adhesion. When we are likely to fail in this, and are threatened with an excess of inflammation in the treatment of wounds, the practice of covering the wounds with pledgets, or compresses soaked in cold water, is peculiarly applicable in military life, and is in general preferable to the common practice of enveloping wounds in a poultice. The latter is only applicable when the hope of a cure by adhesion is altogether given up, when the extent of inflammation is such as to render a different termination inevitable—when, in short, the only alternative is between suppuration and gangrene. The use of cold water is sometimes modified in its application to wounds by a species of irrigation or the employment of a contrivance by which the water falls *guttatim* upon a pledget of lint with which the wound is covered; and warm-water dressings may be employed in the same way. When it is desirable to retain wet or moist dressings on the surface of a wound, evaporation is now successfully prevented by the use of the fine web or cloth made of the gutta percha.

Having now considered the phenomena more particularly observable in simple incised wounds, and noticed the means to be adopted in their treatment, it is unnecessary, in considering the other descriptions of wounds, to enlarge upon those circumstances in which they agree with incised wounds; and instead of recapitulating what has already been said, it will perhaps lead to a more accurate and satisfactory knowledge of the subject to treat it, as it were, by contrast, and to

notice chiefly those points in which punctured, lacerated, and contused wounds differ from those inflicted by incision.

Punctured Wounds are so called from the pointed figure of the weapons with which they are inflicted, and from their penetrating to a depth disproportioned to the extent of the external opening. Those to which soldiers and seamen are more particularly exposed are inflicted with the lance, the small sword, the bayonet, or the boarding-pike. There appears to be, of late years, a disposition—I do not say in the writings of professional men, but of others—to underrate the frequency of bayonet wounds. Numerous instances of their occurrence are recently noticed in M. H. Larrey's Siege of Antwerp; and of the effective use of the bayonet, we have a remarkable instance mentioned by the late Dr. Chisholm, whose batman, Mackay, went into battle on one occasion, during the old American war, with his bayonet perfectly straight, but brought it out twisted, it is said, like a corkscrew, having with his own hand put to death seven of the enemy.

It is the peculiar liability to excite inflammation in the continuous textures, the formation and confinement of matter under fasciæ, the chance of hæmorrhage from injuries of deep-seated vessels, and the risk of tetanus, which constitute the distinctive characters of punctured wounds, and to which the difficulty of treatment and the danger of bayonet wounds are to be ascribed. When a muscle in a state of action is wounded through a superincumbent fascia, it will easily be understood that the orifices do not always correspond when the muscle becomes relaxed—a circumstance which ought to be borne in mind in all cases; and as much mischief is to be apprehended from the inflammation of the fascia, we accordingly perceive that wherever this is strong, fibrous, and tense, the constitutional and local symptoms accompanying punctured wounds are proportionally aggravated, partly from the inflammation of the aponeurosis itself, and partly from the unyielding texture of this substance preventing the swelling, or, as it were, strangulating the muscles beneath it. These consequences are occasionally seen in injuries from bleeding at the bend of the arm, and in punctures of the palmar or plantar aponeuroses, where the violence of the pain and other symptoms are often

greatly disproportioned to the trifling appearance of the external wound. The constitutional symptoms in such cases often run so high as to endanger the life of a patient; and hence our prognosis ought always to be guarded. In punctured wounds passing close to important arterial trunks, we sometimes see these vessels escape in a miraculous manner; and on other occasions we find that an important arterial trunk has been wounded, although, from its being impossible to see the bottom of the wound, and from the flow of blood externally being easily suppressed, such an accident may not at first have been suspected.

In the treatment of punctured wounds, it was long a favourite, and certainly a plausible doctrine, that as many of the untoward occurrences in their treatment were occasioned by a deviation from the nature of incised wounds, the most obvious and most effectual means of removing the obstacles to their cure, was to convert them by dilatation into simple incised wounds. Of all modes of dilating recent wounds, the use of the knife is certainly the least exceptionable; and it is painful to think how much mischief must have been produced in former times by the forcible dilatation of such wounds, through the medium of tents, canulas, and similar instruments. Were the fact established, that a punctured wound, penetrating through various textures, could be converted by the dilation of its orifice into the state of a simple incised wound, the practice would be highly commendable. But the violence with which stabs and penetrating wounds are often inflicted, produces injury to a depth to which we are unable to follow with safety in dilating them, in consequence of the neighbourhood of important parts. In fact, the limited and circumscribed nature of a wound often proves a patient's safety; and as the mere enlargement of the external orifice in such cases could not obviate the injury done to the deep-seated parts, the indiscriminate practice of dilating the orifices of punctured wounds was not founded in reason, and is now very generally abandoned in practice. The necessity of affording an outlet to matter was a more plausible pretext for dilating wounds amongst the older surgeons than we can possibly admit it to be now. Under the old treatment, every wound of this kind necessarily suppurated; but the doctrine of adhesion being now more completely established,

and the mode of promoting it better understood, we have sometimes the satisfaction of seeing punctured wounds uniting through their whole extent, or at least healing without suppuration. This indeed we must admit to be but a rare occurrence in severe punctured wounds; but still we are to proceed, in the first instance, as if we wished and expected that such a termination should take place.

The most formidable obstacles with which we have to contend in cases of punctured wounds, are, as may be inferred from the preceding observations, the excess of inflammation with which they are apt to be followed, the liability of this inflammation to extend along the continuous textures, and to proceed till it terminates in suppuration; thus giving rise to extensive collections of matter, which, not finding a ready exit, from the contracted nature of the wound, insinuates itself under the fasciæ in the interstices of the contiguous muscles, leading to the formation of sinuses and fistulous openings; the cure of which every surgeon knows to be tedious, difficult, and uncertain. So much indeed has a punctured wound been thought to resemble a sinus, that some writers have represented all such wounds as requiring a mode of treatment adapted to the cure of sinuses, and for this purpose some have recommended the introduction of a seton along the course of the wound—a practice which, however applicable to an old, callous, and indolent sinus, where a defect of inflammatory action is the chief obstacle to the cure, would be little fitted to allay the irritation, to mitigate the pain, and to subdue the inflammation, which in punctured wounds are so apt to baffle even the best concerted plans of treatment.

Although some French authors have given us accounts of their having drawn their setons across patients' chests, in cases of stabs, they would find it very difficult, in these days, to convince us that such practices were devoid of harm, much less productive of good. The indiscriminate use of setons, like the preposterous and unmeaning dilatation of the orifices of punctured wounds, is now, happily for the comfort of the patient, and the credit of surgery, entirely laid aside. It was, as Mr. John Bell has justly observed, only fit for that period of our art "when every flap of skin, instead of being reunited, was cut away, when every open wound was dressed

as a sore, and every deep one plugged up with a tent lest it should heal. When M. Guerin continued for thirty days drawing a coarse seton through the breast every morning, and bleeding for the cough every night; what did he do but raise inflammation with his left hand to shew how well he could subdue it with his right?"

Instead of adopting a practice calculated to aggravate inflammation, our chief care ought to be, to adopt measures calculated to keep it under; to prevent, if possible, its termination in suppuration, and, if this cannot be accomplished, to ensure an early discharge to the matter. If the wound is slight, the application of a piece of adhesive plaster on the orifice is often all that is requisite, particularly if the wound is situate in a part of the body where no fascia or membranous expansion has been penetrated; but when the injury is more considerable, when the patient is young and vigorous, and when the wound may have penetrated any of the great cavities, we must be assiduous in the use of every means calulated to prevent and to allay excessive inflammation. With this view blood-letting, saline purgatives, nauseating doses of the antimonial solution, and the most abstemious diet, are often necessary. The blood-letting may be practised both generally and locally. For the latter purpose, the application of leeches round the orifice of the wound, when they can be procured, is highly advantageous, but when not, the general bleeding must be pushed farther, and the local treatment may be trusted, in the first instance, to cooling saturnine lotions applied to the wounded part. Should the pain and tension increase under the use of these means, they may in general be advantageously withdrawn, and warm anodyne fomentations substituted for them during the day, with emollient cataplasms during the night.

In all cases of recent punctured wounds, any bandages requisite to retain the dressings should be applied with very moderate tightness, so as not to prove an obstacle to the swelling of the wounded limb, which in general speedily takes place. When the pain is severe, in punctured wounds, and where much constitutional irritability exists, the use of opium and the warm bath are often beneficial. When, in spite of all our efforts to mitigate the inflammation, matter is never-

theless formed, we must endeavour to procure for it a free and speedy discharge, either by enlarging the wound, or making a counter opening. The practice of dilating wounds, formerly reprobated, comes now to have a meaning; an important object is to be attained—an object which can often be attained in no other way.

There is one description of punctured wounds which requires particular attention—namely, those inflicted by the bites of rabid animals, and venomous serpents. These form frequent objects of attention to military surgeons when serving on foreign stations; and it is much to be regretted that so little practical information of a satisfactory kind is to be met with on this subject. This naturally happens from the little inclination which a professional man feels to write upon a class of accidents where both the curative and the preventative means usually recommended are so little to be depended upon. When the peculiar symptoms resulting from poisoned wounds have once supervened, the recoveries are extremely few; and when these symptoms are supposed to have been prevented, we are always left in doubt whether this has been the consequence of our measures or not.

It has been my fortune, whether good or bad, to see a greater number of deaths from the bites of rabid animals than many of my professional brethren. I have seen not less than six cases of hydrophobia, each of them exhibiting a most distressing combination of mental agony with bodily torment, and each of them pursuing an uncontrollable course to a fatal termination. The prominent symptom characterising the disease —the dread of water, with spasms and convulsions, was present in all of them; and the means of treatment employed were opium, ardent spirits, copious bleeding, and warm bathing. Besides the six fatal cases referred to, I recollect three others; in one of which the occurrence of hydrophobia was supposed to be prevented by producing suppuration in the wound, and salivating the patient. In the other two cases, I am induced to believe that hydrophobia was obviated by an early excision of the bitten part.

While stationed at Hyderabad, in the year 1810, four soldiers were brought to me early one morning, all of whom had been bitten by the same dog, in the course of the preceding

night; two of them in the early part of the night, and the others towards morning. The bitten parts were, in all of them, immediately excised, and the wounds dressed with stimulating ointment, so as to induce suppuration. The result was very remarkable; the two who had been bitten in the early part of the night died hydrophobic; while the others who had been bitten in the morning, and in whom the virus could not possibly have lodged more than an hour or two, never had any symptom of hydrophobia. In a late number of the "Journal de Pharmacie," several remarkable examples are given of the good effects of the actual cautery in cases of patients bitten by mad dogs, at Martinique and at Dijon.

Of the fatal effects of the bite of the *Cobra de Capello*, I have seen several instances in India. One I particularly recollect, of a native girl who was bitten in camp, and who died in a quarter of an hour, notwithstanding the exhibition of large quantities of ammonia, and the excision of the bitten part. From the use of internal remedies in such cases, my hopes are by no means sanguine. One of those most celebrated in the East is the Tanjore pill, the chief ingredients of which are arsenic and capsicum or Cayenne pepper. Of the employment of arsenic, a favourable report is given by Mr. Ireland, formerly surgeon of the 60th regiment, in the second volume of the Medico-Chirurgical Transactions of London; from which it appears that he used it successfully, in large doses, in the cases of several soldiers bitten by the *Coluber Carinatus* in the island of St. Lucia. Besides arsenic, ammonia, opium, and brandy have been the remedies chiefly employed internally, but certainly not with that success which would warrant our placing much confidence in any of them. The practice of sucking the wound, or the immediate excision of the bitten part, seems to me more hopeful. With a view of suspending the absorption of poisonous matter from wounds, the employment of the cupping-glass has been recommended by Sir David Barry, in his experimental researches upon this subject, published several years ago. The observations contained in his essay give great reason to expect benefit from this mode of treatment; and although its efficacy has been hitherto supported rather by theory and experiment than by practical success in treating the bites of rabid or venomous

animals, yet it must be looked upon as a rational, scientific, and promising practice.

Next to excision, the early use of the actual cautery seems the most probable means of safety, and then the different species of potential cauteries. The Potassa was that preferred by Fontana. The Lunar caustic has been, perhaps, more generally used by British surgeons, and the Liquid caustics, or concentrated mineral acids, by foreign practitioners. Bites and stings, particularly those of scorpions, form a pretty extensive class of cases to be met with in Indian practice. These are very painful, and sometimes alarming in their effects. The most popular remedies in India, and perhaps the most effectual, are suction, smearing the bitten part with oil, tying a ligature between it and the heart, and administering repeated doses of opium, ammonia, or brandy.

Allied in their nature and consequences to those wounds which we have just been describing, are the punctures occasionally received in dissection, and which, in particular habits, produce the most formidable consequences. It would appear also, that in some situations, or amongst particular bodies of men, there exists occasionally an epidemic constitution leading to the most unexpected and disastrous results from punctures and wounds of the most trivial description. Such was the case of the seamen on board the Royal Oak, in Basque Roads, and such was the formidable epidemic prevalent amongst the workmen in Her Majesty's Dockyard at Plymouth some years ago. The details of the last-mentioned epidemic are less perfect than could have been wished, in consequence of the death of Dr. Bell, who fell a victim to the disease from having wounded his finger in the dissection of one of the men who died of it. We have, however, been furnished with some observations on the subject by his successor Mr. Dryden, and by Dr. Butter of Plymouth, under the title of "Remarks on Irritative Fever, commonly called the Plymouth Dock-yard Disease." From this title it may be inferred that the febrile affection, the "Constitutional irritation," so well described by Mr. Travers, was what chiefly arrested his attention. But it is remarkable that in almost every case it was of local origin, from wounds or injuries received by the workmen from their tools, or otherwise inflicted in the execution of their duty,

In cases of this kind the first affection manifests itself frequently in the shape of inflammation of the lymphatics, or of the veins of the injured limb, particularly in cases where it has originated from venesection; and still more frequently it appears in the shape of what my late colleague Dr. Duncan, in his valuable paper on the subject, termed "diffuse inflammation of the cellular membrane." In cases which have so frequently put on anomalous appearances, and which have only of late years attracted a due share of professional attention, it is perhaps premature to attempt a systematic view of the subject; but with reference to its treatment I may observe, and the remark will apply also to wounds more decidedly of a poisoned nature, that in the constitutional affection three different stages may for the most part be recognised—first, great depression of the vital powers; secondly, high vascular excitement; and, thirdly, extreme exhaustion. The first, when it falls under treatment, indicates the use of diffusible stimuli, alcohol, ammonia, and perhaps opium; the second, on the contrary, bleeding, and the strictest antiphlogistic regimen; and in the third stage the treatment is the same as that adopted in cases of profuse suppuration or gangrene, the system requiring to be supported by nutritious diet. The treatment of the local affection is also to be adapted to its various stages. Our first efforts should be directed against its disposition to spread, in which its peculiarity and danger consists; and hence the advantage sometimes gained by exciting a more intense action in the part, with a view of concentrating the inflammation to a limited space. Local bleeding and free incisions, as in erysipelas phlegmonoides, are often beneficial; and it may be observed, that when suppuration or sloughing has once taken place, the peculiarity of the disease is in a great measure at an end—those affections falling to be treated according to the general rules of surgery.

Lacerated Wounds are those in which the parts, instead of being divided by a sharp cutting instrument, are forcibly torn asunder—the edges of the wound presenting a ragged uneven appearance. When a wound is inflicted by a blunt obtuse body, which destroys in some degree the vitality and organization of the contiguous textures at the same time that

it penetrates the skin, the wound is said to be *Contused*, The wounds of this class to which soldiers and seamen are more peculiarly exposed occur from the bursting of muskets, the explosion of shells, the kicks of horses, the detachment of splinters from gun-carriages, and the fall of blocks, &c., from the rigging on shipboard. In many cases, injuries present at the same time both the phenomena of lacerated and contused wounds; one of the most remarkable of which is the frequent absence of that hæmorrhage, which, in simple incised wounds of the same parts, often proves alarming to the bystanders, sometimes embarrassing to the surgeon, and not unfrequently fatal to the patient.

The swelling and ecchymosis which speedily take place in the lips of a lacerated or contused wound, are circumstances in which they differ from incised wounds; and the destruction of the vitality of the surrounding parts leads to a difference in the manner in which lacerated and contused wounds generally heal, and to the adoption of a mode of treatment in some measure different from that recommended in incised wounds. While we find the latter description of wounds prone to reunite, and to require for this purpose nothing more than that their lips should be brought into contact, and retained in accurate apposition, contused and lacerated wounds seldom heal without suppuration, and often not without extensive sloughing, proportioned to the injury which the contiguous parts may have sustained. As the extent, however, to which this sloughing or destruction of the surrounding parts may proceed is not to be exactly known *a priori*, and as we shall diminish the sufferings of the patient and expedite the cure in proportion to the extent of reunion by the adhesive inflammation which we can obtain, it is proper in the first instance, after the removal of foreign bodies which frequently lodge in lacerated and contused wounds, to bring the edges of the wound as nearly into contact as may be done without force, and to retain them so by slips of adhesive plaster, or by the application of a roller moderately tight; and there are some few cases in which sutures are applicable to this purpose.

It is obvious that a laceration of the integuments may take place without almost any degree of contusion. We may again have a considerable degree of contusion, without its

going so far as to destroy the vitality of the lips of the wound; or the contusion accompanying a wound may be such as entirely to destroy the contiguous texture. In the first two cases the wound may be united wholly or partly by the adhesive inflammation, while in the last, suppuration or sphacelation to a certain extent must occur. And it is possible, indeed it is by no means unfrequent in extensive wounds, that all these three states may be co-existent, and that one portion of a wound may be united by the first intention, while another part of it may fall into a state of suppuration, and a third sphacelate. In wounds penetrating so deeply as to expose the surface of a subjacent bone, it is desirable to reunite as speedily as possible the bottom or interior part of the wound, with the view of preventing any exfoliation of the bone. But it must be remarked that when the wound is inflicted with a blunt instrument, and in consequence partakes of the nature of a contused wound, this contusion is not necessarily diminished as it approaches the bone, but, on the contrary, the bone affording a point of resistance, the parts lying between it and the edge of the instrument are bruised in succession as the weapon penetrates inwards.

The leading principles to be followed in the treatment of lacerated and contused wounds are the removal of foreign bodies, the securing of blood-vessels, the approximation of the edges of the wound, so far as this can be accomplished by the gentlest means, and the adoption of the most strict antiphlogistic regimen. In severe and extensive wounds of this nature, particularly in young and vigorous soldiers who have not been previously debilitated by scanty or irregular living, by the fatigues of a protracted campaign, or by the effects of an ungenial climate, general bleeding will often be highly expedient, indeed often imperiously requisite; and the local evacuation of blood from the neighbourhood of the wound by means of leeches is a most valuable means of obviating excessive inflammation. It is a measure well calculated to make up for the primary hæmorrhage and subsequent oozing of blood from the capillary vessels, which, in incised wounds, is so effectual in moderating inflammation, and is often so highly beneficial.

GUNSHOT WOUNDS.

The wounds inflicted by balls and other missiles form so essential a feature in the injuries incident to modern warfare, that they must necessarily be looked upon as constituting an important part of the business of this course; and in entering upon the consideration of this subject it is necessary to divest ourselves of much of the unsound doctrine and injurious practice of the earlier writers on gunshot wounds. It is necessary to lay aside opinions long prevalent as to the mysterious nature of wounds inflicted by musket balls, and the sovereign virtues of this or of that nostrum in their cure. We must permit the sound sense, the extended experience, and the matured judgment of our modern army surgeons, to overbalance the fanciful opinions and complicated practices to which the older surgeons resorted, at a time when the general principles of our art were less firmly established, and when the novelty of gunshot wounds induced them to seek their cure in applications equally novel.

The various missiles employed by the ancients, and the powerful mechanical contrivances by which they were propelled, it is now unnecessary to consider—the catapultæ balistæ, and other warlike engines having been entirely superseded by the use of gunpowder, cannon, and musketry. As a matter of historical curiosity I may, however, be permitted to remark, that the powers of these ancient pieces of artillery would seem, from the accounts handed down to us, to have been but little inferior to our modern instruments of destruction. Atheneus speaks of a catapulta which threw an arrow to the distance of half a mile, and we are told of others which could throw javelins from one side of the Danube to the other. Josephus has related some examples of the power of these machines. He speaks of balistæ which beat down the battlements and corners of towers, and overthrew many files of soldiers. They were also employed to throw great beams of wood, lances twelve feet long, and stones of not less than three hundred and sixty pounds weight. Even after the invention and general employment of cannon, we find that stones, if not

the only, constituted at least a principal part of the missiles projected by these engines. In Rymer's Fœdera there is an order from King Henry the Fifth to the clerk of the ordnance, and John Bonnet, a mason at Maidstone, to cut seven thousand stone-shot in the quarries there. And we frequently read of cannons or bombards carrying stone balls from two hundred to five hundred pounds weight.

Froissart describes a very extraordinary bombard made by the people of Ghent, under the direction of D'Arteville, and used at the siege of Oudenarde. "Therefore," says he, "to terrify the garrison, he caused to be made a marvellous great bombard, which was fifty feet long, and threw great heavy stones of a wonderful bigness. When this bombard was discharged it might be heard five leagues by day and ten at night." Of this description of artillery we have a good specimen in the Castle of Edinburgh, in the well-known gun called Mons Meg, which is now to be seen on one of the batteries, with some stone-shot adapted to its calibre.

Even these, however, are of small dimensions, compared with other shot of which we read. When Mahomet the Second besieged Constantinople, in the year 1453, he battered the walls with stone bullets, and his pieces were some of them of the calibre of 1200 pounds; but then they could not be fired more than four times a-day. Other shot are mentioned as of 800 pounds weight, and one gun, stationed at the entrance of the Dardanelles, is said to carry a shot of 1100 pounds weight. It would appear that the Turks still retain a partiality for these enormous pieces of artillery, two stone-shot of 160 pounds weight having been found on board the Genoa, after the action at Navarino. Stone-shot of 150 pounds weight were thrown by Tippoo's army at the siege of Mangalore in 1783. It must be observed, however, that the injuries inflicted by such masses are more akin to the accidents occurring in civil life from explosions in quarries, or in blasting rocks, than to those from gunshot.

The wounding missiles, with the effects of which we are chiefly conversant in modern times, are the common pistol, musket, and cannon balls; shells, grape, and canister shot. I find, from the report of my late friend, Dr. Mackenzie, who saw many of the Turks wounded at the siege of Silistria, and

by a very recent communication from Deputy-inspector Dumbreck, who returned to this country after the battle of Inkerman, that "wounds made with the Minie differ little," as far as he could observe, "from those made by the ordinary bullet;" but "I have weighed," says he, "a Russian Minie ball over an ounce and a half." It is well to advert to the dimensions of the balls used in the different armies with which our troops may come into conflict, particularly in cases where balls are lodged between bones, or imbedded in their substance, and when it becomes necessary to effect their removal by instruments. Besides the common musket bullet composed of lead, the various other projectiles which I have just mentioned are employed in European warfare; and the injuries inflicted by them fall to be considered under the head of gunshot wounds. Although not strictly within the province of Military Surgery, yet, as Army and Navy Surgeons are naturally appealed to in cases of accidents from fire-arms occurring in civil life, it may not be out of place to refer to the patent cartridges lately introduced. These are formed of small shot impacted in cases of wire or strong cartridge paper, the interstices being filled up with bone dust, or some such light substance. The object is to make the charge carry farther, and to prevent its scattering, until it has attained a considerable range. A shot of this kind entering soon after leaving the mouth of a fowling-piece, with its wire case entire, will produce a severe wound, akin to that of a ball; and in the event of the case being broken up by impinging against any hard substance about the person, or against a bone, will produce severe laceration in the track of the wound, and will be more likely to give rise to hæmorrhage or other troublesome consequences than a common bullet wound.

Cannon balls vary in size and weight, chiefly from one to thirty-two pounds, and upwards, to sixty-eight—the latter being mostly employed at sea, or in breaching batteries, and those of smaller dimensions in engagements in the open field. From a letter of Mr. Nasmyth, the inventor of the steam-hammer, which I have lately had the pleasure of perusing, I have reason to believe that the use of shot of much larger dimensions is in contemplation. Grape-shot consists of small iron balls contained in canvas bags, in which a circular wooden

bottom is inclosed, with a spindle passing up through the centre of the bag, and round this the balls are disposed, and secured by means of cord, so as to have some distant resemblance to a bunch of grapes. Canister or case-shot consists of the same description of balls contained in cylindrical cases of tin, closed at the extremities with circular pieces of wood. Both the latter descriptions of missiles are so constructed as to fit the calibre of field-pieces from which they are discharged. Shells are large hollow spheres of iron loaded with gunpowder, which may act either in their entire form as solid balls, or subsequently by the explosion of their contents, and their subdivision into numerous splinters, by which their ravages are greatly extended. Shrapnell shells, so named from their inventor, are hollow spheres loaded partly with gunpowder, partly with balls, and have generally been looked upon as most destructive missiles. It is remarkable, however, that throughout the Duke of Wellington's Despatches, there are numerous complaints of the inefficiency of this description of shot as wounding many but disabling nobody —a circumstance attributed to their having, in the earlier campaigns, been loaded with small-sized pistol bullets.

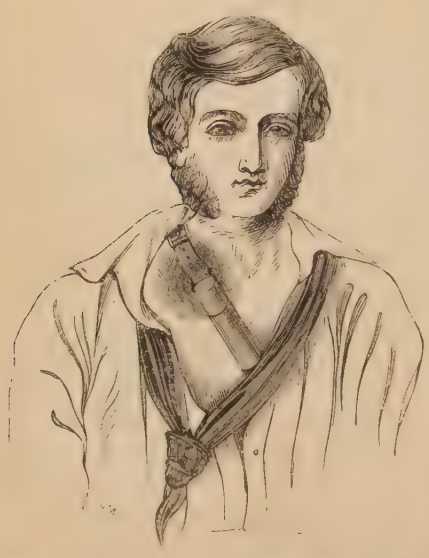
Attempts have been made to calculate with precision the force and velocity of these different projectiles, and to specify the number of files through which each of them will penetrate. Thus, D'Antoni, director of the Military Academy at Turin, calculates, that a 32-pound shot will pierce a file of 70 men at 340 yards' distance, and 44 men at 680 yards' distance ; and he recounts in succession the numbers likely to be wounded by shot of different dimensions, until he comes down to an ounce ball, which, according to his calculation, will pierce a file of four men, if discharged at close quarters, and with the usual degree of velocity. As practical examples of the ravages of shot, it is mentioned that a ball from the Russian batteries at Smolensko killed 22 men, the entire row of a company presented to it in flank. The distinguished French General Moreau was struck by a cannon ball, which shattered his right thigh, passed through his horse, and nearly carried off the left leg. And a similar accident is said to have happened to Major Hicks of the Bombay army at the capture of Pownaghur, in 1844. Those who may be inclined to inquire more particularly into this subject, will find much assistance from a

paper of Dr. Hutton's on the initial velocity of cannon balls, and the force of fired gunpowder, in the 68th volume of the Philosophical Transactions; and some observations on the comparative strength of different species of gunpowder are to be found in Dupuytren's "Blessures per Armes de Guerre." It is obvious, however, that these are subjects little susceptible of accurate calculation. The velocity of a ball may vary according to the quantity and quality of the powder, the length of the bore, and even the state of the atmosphere through which it passes. But, however much the artillerist and engineer may be interested in ascertaining these points with correctness, it must be confessed, as Dr. Hennen observes, "that they lead to little improvement in surgery, except in so far as they show the enormous violence with which the bones may be fractured, and their fragments dispersed either into the medullary cavities, or into the surrounding soft parts."

After these observations on the velocity and force of balls, it will probably surprise those unacquainted with the subject, to be told of the very trivial circumstances which are frequently found to alter their direction. In accounting for the very singular course which balls are frequently found to take, recourse is naturally had to those laws which regulate the direction of moving bodies, and to these it is now time to advert. Although in many cases a mathematical explanation of the course of a ball cannot be given, this arises only from the want of sufficient data; for the causes of many of the peculiarities attending gunshot wounds certainly depend upon the laws by which projectiles are governed, and by which the mechanical effect of a ball is determined. The force and direction of the shot that is received; the position, variety of structure, and powers of resistance in the part receiving it, must always be considered, in order to account for the effects it produces. As a general law, it may be observed, that a body in motion striking against any substance loses a part of its momentum, which is communicated to the substance against which it strikes. If a body in motion meets with a direct resistance equal to its momentum, the motion will be stopped; if this resistance is less than the impetus, the motion will be continued at a diminished rate; and should the resistance act laterally on a body in motion, it will alter its course, and the moving body will fly off from the point at which it meets the resistance, in a line forming an

angle with the line of its original direction. This last proposition, which is important to our present purpose, may be more generally stated thus, as may be seen in various works upon mechanical philosophy:—"A body acted on at once by the impulse of two powers, will not move in the direction of either, but in the diagonal of a parallelogram, of which two sides are formed by the direction given by each of these powers respectively; and every change of impulse or resistance will cause the body to assume so many changes of direction, till at length its momentum is overcome, and it becomes quiescent."

The resistance from the soft parts may be considered as the continued application of a power, the uniform and equable operation of which sometimes causes the motion of a ball to be curvilinear, and ultimately brings it to rest, as is explained by writers on projectiles. In illustration of these propositions a diagram is given in Chevalier's Essay on Gunshot Wounds, and also in Mr. Guthrie's more recent work on the same subject; and on these principles the direction of balls is illustrated at great length by Vacher, an eminent French surgeon, in the Memoirs of the French Academy of Surgery. Regulated then by such laws, and acting upon substances so various in texture as the different organs of which our bodies are composed, balls are often found to have their direction changed by circumstances apparently of a trivial nature. Many instances are upon record where balls have been averted from their course by striking against a button, a buckle, a breastplate, a watch, or a piece of coin in the pocket, and to such an occurrence many a brave man has been indebted for his life. The woodcut, taken from one of my Waterloo sketches, represents the case of Lieutenant Pringle of the



Royal Engineers, whose life was in all probability saved by the strap of his spyglass, which turned off the ball, although he did not escape without a very severe contusion, fracturing the sternal extremities of the first and second ribs. The course of a ball, after having penetrated the integuments, is often changed by impinging against a bone; and in consequence of the resistance offered by the bone to its further progress inwards, while the elasticity and toughness of the common integuments prevents its recoil outwards, it is not unfrequently found to have coursed in a circular direction nearly round the whole contour of the body or of a limb; and has at last made its exit, or been found to have lodged very near to the place of entrance, the tract being marked by a weal or discoloration of the skin. For various examples of the singular courses of balls, I may refer to the paper of Vacher already quoted, and to the practical work of Dr. Hennen.

It has been long known that balls may pass round almost any part of the body immediately under the integuments without entering any of the three great cavities. Of this I have seen several cases on the head and chest, where balls impinging against the cranium, or against a rib, their farther progress inwards had been prevented, and they had taken a circular course round a portion of the head or trunk. Some cases of this kind are mentioned in Mr. Hunter's work, and some in Vacher's Memoir. But a fact still more remarkable, and perhaps less easily explained, is, that balls, after penetrating the thorax or abdomen, sometimes take the internal contour of these cavities, and pass round from one point to another, grazing the pleura or peritonæum, without injuring the contained viscera. This fact, so far as I know, was first noticed by Foudacq, who reports a case in which a ball coursed round the interior of the thorax but without wounding the lungs. It is a circumstance which I cannot vouch for from personal experience, but it is amply confirmed by the observations of Dr. Hennen, who refers to six fatal cases which he had carefully examined. In two of these cases balls had entered on the right of the sternum, coursed round between the pleura and lungs, and passed out near the spine. In two others balls had entered close to the umbilicus, and passed out exactly opposite beside the spine, without wounding any important

organ. In the other two cases, balls had entered over the region of the spleen, and after having passed round a considerable portion of the cavity, without wounding its contents, were found lodged in a distant part of the abdomen. A remarkable case of this kind was stated to me by Mr. Gulliver of the Royal Horse Guards, in which a musket ball was found lodged in the posterior surface of the sternum, having entered at a distant part of the thorax.

Of this singular course of balls round the interior of the great cavities, I have been offered several ingenious explanations, and, amongst others, was favoured with a very able and elaborate paper on the subject from one of my pupils, Mr. Waugh, of the Honourable East India Company's Service. With reference to that paper, the late Sir John Robison gave me the following note, which offers one of the most simple, and to me most intelligible, explanations of the phenomenon: —"I have looked over the demonstration which you left with me this morning, in the correctness of which I in a great measure concur; but at the same time I think a more familiar and obvious one arises from considering that in such cases a ball will necessarily pursue the path of least resistance, and that it will continue to run round a cavity as long as the force required to deflect it from a straight path does not exceed the power of resistance of the substance which confines and deflects it; and that as soon as, from the interposition of an obstacle (whether that be a harder substance or only a projection of the lining of the cavity), more force is required to deflect the ball than is sufficient to rupture the parietes, the ball will take the line of least resistance and escape, or else be led to lodge itself in the obstacle, according to the angle at which it may impinge, and to the nature and shape of the opposing substance."

The fact of balls coursing along the interior or concave surface of the limbs in a state of flexion has been long known to military surgeons; and all the practical writers abound with instances in which balls have been lodged in parts of the extremities far from their entrance. In such cases the course of the missile is often regulated by the particular position of the limb at the time of receiving the shot, and hence the practical rule in searching for lodged balls to place the body or limb as much as possible in the position in which it is supposed to have been injured. The woodcut shows

the extent to which balls will sometimes course along under the integuments, and, at the sametime, shows the importance of attending to the position in which the wound is received. This represents the case of Thomas Jones of the Welsh Fusileers, wounded at Waterloo. The ball entered at the top of the sternum, nearly in the mesial line, passed along the whole trunk of the body, and was cut out at the groin, to the right of the scrotum. He was a front rank man, and was kneeling to fire when he received the wound.

There is no end to the examples on record of the singular directions which balls are found to take in their course through different parts of the body; nor is it possible, from seeing the entrance and exit of a ball, to judge what the parts are which it has injured in its passage, or what parts may have escaped. While daily instances occur of musket or carbine balls, buttons, or other articles being carried into or lodged in parts of the body distant from their entrance, we have examples of masses of a very extraordinary and almost incredible size being lodged in a limb. The immense rapidity with which these bodies are propelled, not only forces them into the soft parts, but compacts these parts together, while the space they originally occupied is filled by the projected body. The following woodcut from the Waterloo sketches, represents the case of James Twiner of the 1st Guards,

who was struck by a splinter of a shell below the crest of the ilium, a hardness was felt repeatedly in the space included within the dotted lines, in the thoracic region, and the tumefaction at length subsiding, the hard body was found to be movable, was cut down upon and excised on the twenty-fifth day after the battle, when it proved to be a piece of a shell weighing nine ounces and a half. The man's recovery, which was progressing favourably, is said to have been greatly promoted by his patient and cheerful disposition.

The elasticity also of the parts allows of substances of a very large size to pass in without the external orifice in any degree corresponding to the size of the body—musket balls often leaving an orifice which, without stretching, would not admit more than a common bougie. It is to be observed, however, that this remark applies only to the soft parts of the body, or to the spongy extremities of the long bones; for in passing through the flat bones, as, for instance, the upper parts of the cranium, the scapula, or the ilium, the aperture made by a ball is generally larger in diameter than the ball itself. From want of due attention to this point, we have a curious instance of an erroneous judgment formed by one of the tribunals in France, before which a prisoner was tried for murder, and was acquitted, because the hole made by a ball in passing through the ilium was found to be eight lines, while the diameter of the prisoner's musket was only six and a half. As if a case had been wanted to show the absurdity of this verdict, an instance

occurred almost immediately afterwards of the suicide of an officer of the Gendarmerie; and here the hole made in the parietal bone by the discharge of a cavalry pistol was found not only to exceed the diameter of the ball, but to admit with ease the barrel of the pistol itself.

Before proceeding to consider more minutely the appearances exhibited by a gunshot wound, I shall take the present opportunity of briefly adverting to those accidents supposed to proceed from what has been termed the "wind of a ball," accidents which are yet perhaps but imperfectly explained. One remarkable case of this kind fell within my own observation, in which an officer's knee-pan was dislocated, as he firmly believed, by the wind of a shot during an action on shipboard. Several accidents of this kind are noticed in Sir Gilbert Blane's Diseases of Seamen; and amongst others, those of two men who were killed in Lord Rodney's action in the West Indies, by balls passing across the pit of the stomach. In the Edinburgh Medical Journal for the years 1812-13, a series of papers on this subject are to be found—one by Mr. Forbes, a clergyman, who conceives that the sudden deaths, and other accidents attributed to the wind of a ball, are owing to the vacuum produced by the rapid motion of the ball through the air. "When a ball," says he, "passes close to the stomach, there is, in the first place, a great addition to the pressure on that viscus from the condensation of the air; as soon as the ball has passed, this pressure, with a great part of that of the atmosphere, is taken off, the consequence of which is a sudden expansion of all the fluids in the stomach and the blood in its vessels, and the consequent rupture of both." Mr. Spence, a naval surgeon, attributes these accidents, particularly on shipboard, to the detachment of light substances from the rigging, such as pieces of canvas, rope-yarn, &c.; or part of the wadding, he conceives, may be carried along with the ball, and, impinging against the body, produce similar effects. Mr. Ellis, in a third paper in the same Journal, ascribes these injuries to electricity, generated by the passage of balls through the air. This hypothesis has attracted more attention than either of the former; but, like the others, "it wants the support of positive evidence, while much negative evidence may be brought against it."

Circumstances are constantly occurring, such as the removal of portions of the soldier's dress or accoutrements by balls, without any injury to his person, which militate against all the explanations given of the wind of a ball. Surgeons seem now generally agreed, that the accidents ascribed to this cause cannot happen without the actual contact of the ball. And this is no new observation, for it is stated by Johnson, that "when another Dutch war broke out in 1672, Sheffield went again a volunteer in the ship which the celebrated Lord Ossory commanded, and there made, as he relates, two curious remarks:"—"I have observed two things which I dare affirm, though not generally believed. One was, that the wind of a cannon bullet, though flying never so near, is incapable of doing the least harm; and, indeed, were it otherwise, no man above deck would escape."

It is not difficult to conceive that, where the injury is fatal from an internal lesion, death may take place so suddenly as to afford no time for the development of any external mark of the accident. And we are assured by Baron Larrey, that in all such cases he has found so much disorder and disorganization internally, as leave him no room to doubt of the mechanical contact of the ball. The following is the Baron's explanation of the phenomenon — an explanation, so far as I can judge, quite analogous to that suggested in Sir Gilbert Blane's work, and in which also Mr. Guthrie, the first authority in this country, seems disposed to concur:— "A cannon ball is propelled at first with a rectilinear movement; and if during this part of its course it strikes against any part of the human body, it carries it away; but the ball, after having traversed a certain distance, undergoes some change of motion in consequence of the resistance of the atmosphere and the attraction of the earth, and turns on its own axis, in addition to the direct impulse received from the explosion of the powder. If it should strike any part of the body when the velocity with which the ball is passing is greatly diminished, it does not carry it away, as in the preceding case, but in consequence of its curvilinear or rolling motion, it turns round the part in the same manner as a wheel passes over a limb, instead of forcing a passage through it. The soft elastic parts, such as the skin and cellular membrane, yield, while the bones, muscles, tendons, arteries,

&c., offering a greater degree of resistance, are either bruised or ruptured. If the ball should strike one of the cavities of the body, the viscera suffer in like manner." It would appear that military as well as medical officers are somewhat sceptical as to the alleged effects of the wind of a shot. Colonel Wilkie, in one of his papers on the "Colonies as Military Posts," adverts to the singular case of a Highland captain who was tried by a court-martial and dismissed the service for alleging that he was knocked down by the wind of a shot at the Cape in 1805. Were trials of this kind more frequent we might possibly hear less of the mysterious effects of the wind of a ball.

But to advert to the more obvious and more common consequences of gunshot wounds.—These injuries are so various in degree, and so different in texture and in function are the parts upon which they happen to be inflicted, that no train of symptoms can be enumerated as applicable to all cases of gunshot wounds. The simple passage of a musket bullet through the arm or thigh of a healthy subject, when it does not injure the bone or wound any important arterial, venous, or nervous trunk, is not in general attended with any urgent or alarming symptoms. The pain attending it is frequently found to attract little of the patient's attention; and he is only induced to notice it in consequence of more or less impediment to the motion of the limb, with a sense of numbness rather than of pain, and some degree of tremor. No hæmorrhage of any consequence occurs from such a wound, and on the part being more particularly examined, we observe a circular hole, with its edges somewhat inverted and generally blackened, marking the entrance of the ball; and when the ball has passed out, we find an opening more irregular in shape, larger, free from blackness or discoloration, and with its edges rather everted.

If the ball in its passage has cut across or lacerated an important arterial trunk, there may be hæmorrhage superadded; or if a large nerve has been injured, the sense of numbness is superseded by a distinct, sometimes even an acute feeling of pain, with loss of motion in the member. If, in addition to this, the bone should be broken or extensively shattered, the patient loses the command of the distal part of the limb, or becomes unable to support himself upon

it. In severe and complicated injuries of this kind, more particularly those from large shot, we often see the whole nervous system implicated in the accident, so as to produce a complete constitutional shock. This, however, varies exceedingly according to the patient's natural temperament, or his peculiar state of susceptibility at the time of receiving the wound. Some men, upon the receipt of even a moderate injury, are instantly seized with a deadly paleness, profuse perspiration breaks out, vomiting occurs, and an irresistible tremor affects the limbs—in short, a complete shock, the "ebranlement" of the French writers, takes place. Other men will receive a much more severe injury, amounting to the complete comminution, shattering or removal of a limb, without betraying any symptom of mental or bodily agitation —will even reason coolly about the consequences of the accident, or vent their rage upon the source of it.

This constitutional shock, this ebranlement above described, varies as much in duration as in severity, in different cases. Some individuals regain almost immediately their coolness and self-possession, become speedily reconciled to the injury sustained, and prepared, if necessary, to submit to any operation. Others continue for hours under a degree of nervous agitation and tremor which nothing can abate, which no assurance of their ultimate safety can calm, which renders them totally unfit to undergo an operation, should this be thought necessary, and which indeed often subsides but with life. A person labouring under this nervous tremor and agitation has so much the appearance of being panic-struck, so much does it look like the effects of fear, that some of the French writers have thought it necessary to defend their countrymen against any imputation of this sort. Ravaton and La Motte contend that "this confusion cannot be the effect of fear, in a nation noble-minded and courageous to excess, and who, after lying mortally wounded upon the field of battle, are heard encouraging their companions to fight bravely for their king and country." Le Dran, again, without fearing any imputation on the courage of his countrymen, observes, that "from a principle which nature has established in the human mind, it is, that as soon as one feels himself wounded by fire-arms, he is struck with a panic and oppression too violent to be concealed. In that first moment of alarm his reason gazes on nothing but danger, and there

often follows a deprivation of almost every sense." This temporary suspension or derangement of the powers of the system becomes, in connection with gunshot wounds of the extremities, a matter of great importance in reference to the propriety of an immediate operation for the removal of the limb, and will fall to be considered more particularly hereafter. At present I may observe, that the alarming symptoms above described are not less conspicuous in wounds affecting the trunk of the body, particularly the great cavities; but here we have often superadded peculiar symptoms, from the nature and functions of the wounded viscus, and to these I shall advert particularly when I come to speak of the wounds of particular organs.

In proceeding to consider the dressing and mode of treatment in gunshot wounds, it is now unnecessary to advert to the opinions formerly entertained of the poisonous nature of such wounds, "about which," says Wiseman, "great hath been the contention amongst the learned." But in order to understand the manner in which these wounds are healed, it is necessary to observe that they possess much of the character of contused wounds, the contusion, however, in this instance radiating as it were from a centre outwards, instead of proceeding, as in the common contused wounds of civil life, from the surface towards the deep-seated parts. With reference to the passage of a musket ball or small-sized shot through any of the soft parts of the body, it may be remarked that the tract of the ball from its entrance to its exit gradually loses the character of a contused, and takes on more of the character of a lacerated wound. The injury done to the contiguous soft parts has been well illustrated by my late colleague Sir Charles Bell, by means of a series of concentric circles. The innermost of these circles may be supposed to represent a portion of animal substance, forming the parietes of the tubular wound, in which the vitality has been so completely destroyed as to induce sloughing. Between this interior circle and the next the injury to the soft parts may be such as to induce suppuration. Between the second and third circles again, the injury may be such as to induce a slighter degree of inflammation to terminate in resolution, without either suppuration or sloughing; and it will be easily understood, that in the course of the wound these concentric circles will gradually change their dimensions, or, in other words, will progressively shorten their

respective diameters as the wound loses the characters of contusion, and takes on those of laceration or incision.

This enables us to understand the usual process of healing in gunshot wounds by suppuration and sloughing—these of course more or less extensive according to the degree of contusion. It enables us also to understand an occurrence—certainly a very rare one—the healing or uniting of the whole tract of a musket ball almost without a vestige of suppuration, or, to speak more technically, by the first intention. Of this I once met with a remarkable instance in the case of a musket shot passing through the region of the biceps, or upper part of the arm. The patient was a man of colour, a native of India, living on the most mild and unirritating food, and in every respect a favourable subject for such a cure. A case quite analogous to this was furnished to me by Dr. M'Whirter, the late President of our College of Physicians; it was that of Colonel Pitman of the Bengal army, who was wounded by a musket shot, which entered the outside of the biceps muscle, and lodged in the opposite side of the arm, near the surface. He cut out the ball, and as Colonel P., although a stout plethoric man, was very abstemious in his diet at all times, it occurred to Dr. M. that, by applying adhesive plaster to the external wounds, and keeping the tract of the internal wound together by compresses, it might promote adhesion. This plan he pursued, and succeeded beyond his expectation. The arm was sound in a fortnight without any suppuration. These cases, however, form the exception and not the rule. Although I am not able to say what was the appearance of the ball in either of the above cases, yet such cures are, I think, most likely to happen when the wound is inflicted by a rifle shot, or by a ball which has been by some accident deprived of its naturally globular form, and perhaps acquired an angular or projecting edge, so as to penetrate the integuments with less contusion. Of balls altered in this way numerous examples are to be seen in the museum.

Although in the days of Celsus, gunpowder and its irresistible effects were equally unknown, yet the peculiar nature of wounds occasioned by the forcible intrusion of leaden bullets into the living solid, did not escape the notice of this elegant writer, as we find from the following passage in his seventh book. When speaking of the extraction of foreign bodies

from wounds, he observes, "A third kind of weapon which requires sometimes to be pulled out, is a leaden bullet, or a stone, or some such thing, which having broke through the skin is entirely lodged within. In all these cases the wound must be enlarged, and what is within must be extracted by a forceps the way it entered." Celsus then goes on to give particular directions for the extraction of foreign bodies when imbedded between, or in the substance of bones. And while we have in this author, so far as I know, the first mention of leaden balls as wounding bodies, we have also, perhaps, to attribute to him the foundation of the practice of scarifying and dilating gunshot wounds, which many subsequent writers have enforced with so much energy, and which, without due confidence in the resources of nature, have been often practised with painful and injurious effects.

The indications in the treatment of gunshot wounds vary considerably according to the extent of the injury. The principal objects are, to remove the ball if it has lodged, or any extraneous substance which may have been carried in with it—to remove any fragments of bone which have become so completely detached as to afford no hope of reunion, and which are of course to all intents and purposes, acting as foreign bodies—to secure any important blood-vessels which may have been wounded—to circumscribe the inflammation by the adoption of the most vigorous antiphlogistic practice, and of course to limit the suppuration, without a considerable extent of which a gunshot wound seldom heals. If a musket ball passes through the fleshy part of a limb, our practice is simply to sponge the orifices clean, and to cover them with a little scraped lint, securing it with two cross slips of adhesive plaster, and keeping the limb as much as possible at rest. If the ball has passed through the parietes of the chest or abdomen, and if no hæmorrhage ensues, we are, in addition to the above simple mode of dressing both orifices of the wound, to have recourse to the abstraction of blood, say from twelve to twenty ounces, according to the age, size, and state of health of the patient. And this precaution of bleeding is equally necessary where balls or splinters of shells may have produced much contusion of the head, trunk, or great joints, even when no wound or solution of continuity occurs.

A ball will sometimes, without penetrating through a

limb, be retained simply by the cohesion and elasticity of the common integuments, and is distinctly to be felt projecting on the opposite side of the limb. In this case our business is instantly to make an incision over the ball, and to remove it; thus rendering the wound similar to the one first described, and falling to be dressed precisely in the same way. The immediate removal also of every extraneous substance which may have been carried in with the ball, and of every detached and angular piece of bone, is an object of the greatest importance. I have recently been much pleased to find the doctrine which I have long taught upon this subject so forcibly inculcated in the following passage from Mr. Alcock's writings:—"From many instances that I have seen of the great, and more than once fatal, anguish occasioned by the presence of foreign bodies, I am inclined to go farther to insure their extraction than is generally recommended. If the ball can be felt, it matters not what depth of muscular parts may lie between. I would have it extracted, and, if necessary, incisions made for that purpose."

Numerous instruments have been devised for the extraction of balls, and I am in possession of not less than fourteen of these, including the *tire-ball* of the old surgeons, figured by Peter Lowe in his black-letter book. Besides most of those figured in the writings of Scultetus, Brambilla, Thomasin, Percy, and Assalini, I have also specimens or drawings of some now in use in the Crimea, of which those of Coxeter and Tufnell are, I believe, most in repute, but I have declined to figure any of them, as this would be showing a preference which I am not prepared to support without personal experience. The forefinger, if it can be made to reach the ball, is of all others the most instructive instrument of research, and aided by the common bullet-forceps of the English army, in use during the last war, will go a great way to accomplish the removal of balls. This is an opinion which my own limited experience of the matter leads me to entertain, which I have long expressed, and which I am much gratified to find confirmed by Dr. Dumbreck's recent experience in the war of the Crimea. Of the instruments more recently brought forward, one is a modification of a ball-extractor figured in Thomasin's "Extraction des corps etrangeres des plaies," and another is an improvement upon an instrument sent down here to the Medico-

Chirurgical Society, many years ago, and made over to me. That instrument, like some others, has disappeared from my collection, but I am still in possession of the plate which accompanied it. It is remarkable that many of the ball extractors to which I refer, are only calculated to remove balls which have preserved their globular form, and are less calculated to succeed in those more difficult cases where balls have been altered by impinging against hard bodies before, or against bones after, they have entered the body. It is remarkable also, that those who have had most practice in this department of surgery do not represent the extraction of balls to be so difficult as the multiplicity of instruments would lead us to suppose. We do not find, so far as I recollect, that Ambrose Paré, Baron Larrey, Guthrie, nor Alcock, have enlarged much upon this subject.

If the ball in its passage has wounded an important arterial trunk, and if, in consequence of this, a hæmorrhage occurs, it then becomes necessary to dilate the wound in the course of the injured artery, so as to secure it by ligatures both above and below the orifice; and to no measure short of this can we trust. The incisions necessary to attain this object must often be extensive; but the purpose is so important, so absolutely essential to the patient's safety, that no apology can be admitted for neglecting it. On this point Mr. John Bell has expressed himself most distinctly, and here he has given an intelligible reason for dilating a gunshot wound—a practice, however, which the general tenor of his writings tends to inculcate on other occasions where it is not necessary. Where such a motive exists for the dilatation of a wound, no surgeon will hesitate; but the indiscriminate dilatation of all gunshot wounds, without a distinct and specific object in view, is now very justly abandoned, at least by the English surgeons. It seems indeed extremely absurd to have made the practice of dilatation so uniform, that "a man should of necessity be cut because he had the misfortune to be shot."

It would appear that this practice of indiscriminate dilatation was pursued by the French surgeons up to a late period; for Mr. Alcock, in a letter to me, states, that upon a recent occasion, after the assault of Irun, a military ambulance was despatched from Bayonne, with offers of assistance to the

wounded; and that all the Spaniards who fell into their hands were unmercifully estrellated by the French bistoury. To this general rule there is, however, at least one creditable exception. M. Baudens, chief surgeon to the French troops serving in Algeria, seems to have had his eyes opened to the mischievous effects of this exclusive rule; and his conversion seems to me a point of so much interest and importance, that I am induced to give the account of it in his own words:—

"Je débarquai à Sidi-Ferruch avec une provision de science et de théorie que je croyais complète et inépuisable. Et d'abord, imbu des doctrines qui dirigent encore aujourd'hui le plus grand nombre de nos chirurgiens, je n'hésitai pas à débrider les plaies faites par le plomb; j'agissais ainsi par conscience, mais non sans pitié pour les malheureux que je torturais cruellement. J'avoue que les cris de la souffrance avaient fini par ébranler vivement mon âme et même mes convictions, quand un voltigeur, qui venait d'avoir les deux cuisses traversées par une balle dans leur tiers supérieur et sans fracture, me fut apporté.

"Il fallait, pour opérer convenablement le débridement, inciser largement et à une profondeur de plusieurs pouces, les quatre plaies déterminées par le plomb, et le courage me manqua. Les blessures furent pansées simplement; un bandage roulé et contentif, constamment arrosé d'eau froide, fut appliqué sur le membre dans toute son étendue; quelques saignées générales furent pratiquées de bonne heure, pour ne pas laisser trop d'éléments à la fièvre traumatique; et tandis que, redoutant d'avoir été téméraire, je m'attendais à voir survenir l'étranglement avec tous les symptômes alarmants qui l'accompagnent, la guérison s'opèrait avec calme et rapidité.

"Dès ce moment ma conversion fut opérée, et j'ai démontré depuis, par des milliers de faites observés de bonne foi, que le débridement préventif des plaies d'armes à feu est toujours nuisible."

I have now adverted to the chief points demanding our attention immediately on the infliction of a musket wound, and perhaps to all that can be done on the field of battle. Here cases demanding the surgeon's attention are often so numerous and so urgent that no protracted search for balls,

extraneous bodies, or splinters of bones—nothing, in short, which is not absolutely essential to the patient's safety can be allowed. In speaking of operations which are with propriety undertaken before quitting the field, I include amputation of the limb when this is obviously necessary; but as I shall have occasion to advert more particularly to this in a subsequent part of the course, I barely notice it at present as one of those operations which, when its necessity is determined on, is always best done so soon as our patient has recovered from that collapse of the vital powers which has already been described, which is so apt to overpower even the most cool and determined individual on the receipt of a severe wound, and which, however alarming in its appearance, is often speedily removed by the administration of a cordial glass of wine or spirits, and the soothing attention and consolatory language of an experienced surgeon.

Whenever a soldier has by this means recovered from the immediate stupefaction consequent upon the receipt of the blow, and has regained his self-possession, he will in general be found anxious immediately to undergo any operation deemed necessary to his cure; and it is obviously our duty to indulge him in this respect as far as circumstances render it judicious, and as far as a due attention to the numerous and urgent claims upon our humanity will give us time to accomplish it. No opportunity so favourable will again present itself for the execution of many of those operations which are required after the infliction of gun-shot wounds; and the superior success of primary compared with consecutive amputation, to which I shall again have occasion to advert, renders it imperative upon the military surgeon to give a preference to the former. In making the first examination of gunshot wounds, it may be necessary to warn young surgeons against wasting, in endeavours to satisfy an idle or unprofitable curiosity, the time which may often, in trying circumstances, be employed to much better purpose. In wounds of the limbs, attended with lacerated vessels and broken bones, it is our business to examine the state of the wound accurately, for the purpose of removing splinters; and the necessary use of the finger and of the probe for this purpose is never so well borne at any subsequent period. In

wounds of the belly, or of the breast, when a ball has penetrated deeply into or passed through these cavities, it is our duty to rest satisfied without the knowledge of those circumstances, which, if ever so well known to us, could in no way alter our practice.

In the treatment of gunshot wounds, a material improvement has of late been introduced by the substitution of cloths wrung out of cold water for the poultices almost universally used in former times. The practice previous to the Peninsular war was, in almost every case, to apply a poultice in order to hasten the separation of the slough, which was looked upon as an inevitable consequence of every gunshot wound. Mr. Hunter's writings tended much to inculcate this principle, and to confirm the practice growing out of it; but it was soon found to be absolutely impracticable on the large scale of warfare, and even if practicable, to be neither expedient nor beneficial to the patient. The history of the application of cold water as a dressing to wounds is exceedingly interesting. It was soon after the invention of gunpowder employed by the Italians, who did not consider it to possess any virtue until it had undergone certain mysterious and magical ceremonies. Blondus published an essay on its efficacy at Venice in 1542, under the title, "*De Medicamento aquæ nuper invento, et de partibus ictu sclopeti sectis.*" This was followed by the extensive use of cold water "sortileges et paroles charmées," by a quack of the name of Doublet, at the siege of Mentz, in 1553. Other writers followed on the same subject; but, notwithstanding this, the remedy continued long in the hands of quacks and medical conjurors; "for although the regular practitioners could not deny that wounds were healed under the employment of water solely, yet many of them affected to attribute this consequence to magical and unchristian arts, and it is doubtful whether in those days patients having any pretensions to piety would have submitted to the employment of the simple element, labouring as it did under the anathema of the church."

Compresses dipt in cold water have lately been recommended by Kern and Assalini, as well as by our countryman Mr. Guthrie, who has taken some pains to show that the sloughing consequent upon musket wounds does not neces-

sarily take place to the extent formerly supposed, and that the extent of this sloughing and suppuration may still farther be diminished, and the cure promoted by the judicious application of compresses soaked in cold water. By this means inflammation is in some instances prevented, in others moderated, and in almost all, much circumscribed. When this plan is adopted, oil skins should be employed to prevent the beds getting saturated with the liquid, by which severe pulmonary and rheumatic attacks are sometimes induced; and with these precautions, the surgeon can be at no loss for a remedy, which is seldom injurious, and rarely if ever interferes with the efforts of nature. There are, however, particular habits with which cold applications do not agree; and I believe it may be asserted as a general principle, "that cold does no good in any stage of inflammation when it does not prove agreeable to the feelings of the patient,"—when, in short, it does not give relief. In such cases warm fomentations, irrigations, or cataplasms, are advantageously substituted; and leeches applied in the neighbourhood of the wound, or the abstraction of blood from the system at large, are in some cases requisite.

The foregoing observations are chiefly applicable to musket wounds. Those from cannon shot are in many cases sufficient causes for the amputation of a limb, and will fall to be considered hereafter. Of late we have got rid of much of the mystery formerly attached to the nature of gunshot wounds; and have acquired more useful lessons in learning to dispense with idle, inefficient, or injurious practices, than in the employment of any remedy of a specific nature, exclusively applicable to these injuries. Neither soldiers nor surgeons are now apprehensive of anything poisonous in a leaden ball. Nobody now believes in the mysterious efficacy of silk vestments, which were at one time thought to be impenetrable by balls; nor are we now so credulous with regard to the "wind of a shot." In the treatment of gunshot wounds our views are now for the most part bounded by the following simple indications:—The removal of the ball itself, and of any portions of the clothing or accoutrements which may have been carried in with it, the removal also of detached portions of bone, the securing of wounded blood-vessels, the

moderating the violence, and circumscribing the extent of the consequent inflammation by means of cold applications, leeching, or general blood-letting.

WOUNDS OF THE ARTERIES.

In treating of the different kinds of wounds, we have had repeated occasion to advert to the occurrence of hæmorrhage from the division of blood-vessels; and before proceeding to consider the wounds of particular regions and organs, it is necessary to offer a few remarks on the wounds and diseases of the arterial and nervous systems which are universally distributed throughout the body, and the wounds of which are a subject of infinite importance in the practice of military surgery. The loss of life is so natural a consequence of uncontrolled bleeding from a large vessel, that surgeons have in all ages looked with anxiety to an efficacious means of restraining hæmorrhage; and the reflection that three-fourths of those killed in battle are supposed to die from the escape or extravasation of blood, is a circumstance noways calculated to diminish this anxiety. It imposes upon the military and naval surgeon, more particularly, the imperious necessity of keeping alive his anatomical knowledge. The more accessible and eligible points for securing the principal arteries I am in the habit of shewing upon the dead subject; and the introduction of an anatomico-chirurgical sketch of the course and distribution of the arteries as bearing upon wounds of the several regions of the body has been suggested to me; but this would necessarily lead me into a detail which I have not contemplated in the publication of these "Outlines."

The various expedients resorted to for arresting a flow of blood may be looked upon as either of a temporary or permanent nature, and as operating either indirectly on the trunks conveying the fluid to the bleeding point, or directly on the orifices of the bleeding vessels. As a temporary expedient for the suspension of hæmorrhage in wounds and operations, the tourniquet is an instrument with which every surgeon of

the present day is familiar. For the invention of this instrument, as well as for the greatest improvement it has ever undergone, we are indebted to two eminent French surgeons, Morel and Petit. The former was the first to employ the tourniquet in a very simple form at the siege of Besançon, in 1674. A ligature or broad tape being passed round the limb, a wooden pin was employed to tighten it, in the same way that carters employ what in Scotland is termed a rack-stick to tighten the ropes which retain the loads upon their waggons. A particular description of this mode of restraining hæmorrhage is given by Mr. Young in the "Currus Triumphalis," published in 1768 :—"I hope," says he, "it will not be altogether impertinent if I here take occasion to recommend to the young practitioner one way of ligature very useful in amputations, especially above the knee—that is to say, a wadd of hard linen cloth, or the like, inside the thigh, a little below the inguen ; then passing a towel round the member, knit the ends of it together, and with a baton, a bed-staff, or the like, twist it till it compress the wadd or bolster so very strait on the crural vessels, that (the circulation being stopped in them) their bleeding, when divided by the excision, shall be scarce large enough to let him see where to apply his restrictives ; nor shall the pain of that operation be comparable to what it would be were not the member numbed by the compress."

If a tourniquet constructed in this way possesses any advantages in military practice, it is the ease and expedition with which it can always be procured. A handkerchief, a sash, a garter, or brace, twisted by means of a drumstick, a fife, a pistol ramroad, or some such instrument, will answer every purpose to which this mode of compression is adapted. Its disadvantages, on the other hand, are its comparative bulk and unwieldiness, the difficulty of adjusting the compression with sufficient accuracy, and its requiring continued attention, or some peculiar contrivance to prevent the recoil of the stick, and the consequent removal of the pressure. The improvement in the construction of the tourniquet which was introduced by Petit consisted in the adaptation of a pad to be placed over the course of the artery, and the tightening of the strap by means of a screw so adjusted as to separate gradually the two

plates of the instrument through which the strap is passed. This forms an instrument very superior to the other in point of neatness and accuracy of application. With either of them a sufficient power may be employed to put a complete stop to the effusion of blood in all wounds and operations upon the extremities, so as to enable the surgeon to execute the different steps of an operation with safety to the patient and ease to himself; but as the tourniquet is capable of putting a complete stop to the circulation of a limb, so must its application be regulated with prudence, and its employment limited in point of time.

With a view of extending as far as possible the security derived from the tourniquet to those wounded in battle, it has been proposed to point out to the musicians of a regiment the course of the principal arteries, and to instruct them in the application of the tourniquet. The difficulty, however, of making the subject intelligible to uneducated men, the risk of mistakes, the danger of trusting a matter of this importance to inexperienced youths, and of delegating the proper duty and responsibility of the surgeon to non-professional assistants, have prevented this recommendation from being acted on to any great extent. I see, however, that in the Naval Regulations, the surgeon is enjoined to "instruct all those stationed with him, as well as others, in the use of the tourniquet, and that whenever the ship shall be cleared for action, he is to cause a sufficient number of temporary substitutes for that instrument to be made and distributed to the different quarters, sending two or three at least into each top."

Previously to the invention of the tourniquet, its place was supplied by the powerful gripe of an assistant, and we find some of the older surgeons complimenting each other on the effectual manner in which they suppressed the hæmorrhage in cases of amputation by grasping the upper part of the limb. In very recent times the practice of compression by the hand of an assistant has again been revived, and it becomes military men above all others to make themselves familiar with this practice, and thereby to render themselves as far as possible independent of complex instruments or extraneous resources. The error of supposing it impossible to make an effectual compression on the main artery of a limb, so as to restrain its

bleeding, has of late been abundantly exposed by Mr. Guthrie; and wherever the pressure does not require to be protracted, there can be no better method of making it than by the hand of the surgeon or his assistant. But a plan of permanently suppressing hæmorrhage, confined exclusively in its operation to the opened vessels, and equally applicable to all parts of the system, has always been a desideratum to the practical surgeon.

Of the means employed at different times for this purpose, I shall immediately proceed to give a summary account, but in the first place it is necessary to state that, although punctures or very limited wounds in the arteries may possibly heal without obstructing the calibre of the vessel, this is an event which we are not to look for in practice, and for the accomplishment of which no means have been proposed since the attempts made many years ago, by Mr. Lambert of Newcastle, to close the wounds of arteries by means of the twisted suture. The process followed by nature in the spontaneous suppression of hæmorrhage, or in closing the mouth of a divided artery, was first investigated by Petit in 1731, and this investigation was subsequently prosecuted by Morand and Pouteau, as well as by our countrymen Sharpe, Gooch, Aitken, Kirkland, and John Bell. About the beginning of the present century the further investigation of this matter was undertaken by Dr. Jones while prosecuting his duties at this university, and his observations were given to the public in a work on hæmorrhage, published at London in 1805. In this essay, Dr. Jones takes a much more comprehensive view of the subject than any of his predecessors, and in his explanation of the natural process for closing the orifice of a divided artery, notices the changes which take place—in the tunics of the wounded artery itself, in the cellular sheath embracing it, in the blood circulating through it, and in the soft parts contiguous to it. His experiments show that the blood, the action, and the structure of arteries, their sheath, and even the cellular substance connecting them with it—in short, that all the parts concerned in or affected by hæmorrhage contribute to arrest its fatal progress. "An impetuous flow of blood, a sudden and forcible retraction of the artery within its sheath, and a slight contraction of its extremity, are the immediate and almost simul-

taneous effects of its division." This again, as the impetus of the circulation diminishes from the loss of blood, is followed by the formation of a plug or a coagulum within the sheath of the vessel, termed the external coagulum, and forming the "first complete barrier to the effusion of blood."

"The mouth of the artery being no longer pervious, nor a collateral branch very near it, the blood just within it is at rest, coagulates, and forms in general a slender conical coagulum, which neither fills up the canal of the artery, nor adheres to its sides, except by a small portion of the circumference of its base, which lies near the extremity of the vessel. This coagulum is distinct from the former, and I have called it the internal coagulum. In the meantime the cut extremity of the artery inflames, and the vasa vasorum pour out lymph, which is prevented from escaping by the external coagulum. This lymph fills up the extremity of the artery, is situated between the internal and external coagula of blood, is somewhat intermingled with them or adheres to them, and is firmly united all round to the internal coat of the artery. The permanent suppression of the hæmorrhage chiefly depends on this coagulum of lymph; but while it is forming within, the extremity of the artery is further secured by a gradual contraction which it undergoes, and by an effusion of lymph between its tunics and into the cellular membrane surrounding it, in consequence of which these parts become thickened, and completely incorporated with each other. Thus, not only is the canal of the artery obliterated, but its extremity also is completely effaced, and blended with the surrounding parts."

In a paper by my late colleague, Professor Turner, which is to be found in the Transactions of the Medico-Chirurgical Society of Edinburgh, there are some very interesting observations on the sudden spontaneous obstruction of the canals of the larger arteries of the body, and on the process employed by nature to prevent or arrest hæmorrhage from lacerated arteries. But without entering farther into the rationale of this process at present, I would advert to the practical views which have guided the best surgeons in their treatment of hæmorrhage from wounded arteries.

Although Dr. Jones' views regarding the suppression of

hæmorrhage were chiefly founded on experiments made on the inferior animals, they were received as satisfactory, and have very generally been adopted by the systematic writers on surgery. Mr. Guthrie, however, in his lectures on the diseases and injuries of arteries, delivered before the Royal College of Surgeons of London in 1829, has made some important additions to our knowledge of this subject, the more valuable for my present purpose, inasmuch as his conclusions are the result of long-continued and extensive experience on the arteries of the human body, opened or otherwise injured by wounds received in battle. Of the many interesting observations which Mr. Guthrie has brought forward in his recent publications, the following appear to me particularly important, as bearing directly upon points of practice :—

1. The bleeding from an artery cut fairly across is much more easily controlled than has been generally supposed.—"All that is required to suppress the torrent, is to place the end of the fore-finger directly against the orifice of the artery, and with the least possible degree of pressure consistent with keeping it steadily in one position, the hæmorrhage is suppressed."

2. It may be inferred from Mr. Guthrie's observations, that the office assigned to the sheath of the artery, and the formation of the external coagulum, as described by Jones and previously by Petit, are less uniform and less important than those authors imagined, and that the contraction of the artery itself is on the other hand more complete and influential. Mr. Guthrie has frequently observed, particularly in cases of limbs carried away, or arteries torn across by shells or cannon shot, that a contraction of the divided end of the artery takes place, and "is confined in the first instance to its very extremity, so that the barrier opposing the flow of blood is formed by this part alone." The tube of the vessel subsequently contracts to some extent upwards, in the shape of a French claret bottle, and a coagulum is formed within it, as described by Dr. Jones.

3. There is reason to think that the retraction and contraction in the lower end of a divided artery are less complete and less permanent than in its upper end, and that the internal coagulum is also less perfectly formed :—"It is a very

curious and interesting fact, that the lower end of a divided artery is more prone to secondary hæmorrhage than the upper —so much so indeed, that when it occurs after having been arrested for four hours, it takes place in all probability from the lower end."

How far these steps in the natural suppression of hæmorrhage are modified by the application of a ligature, we shall have immediate occasion to consider. Meantime I may remark, that the foregoing observations obviously go to confirm the rule inculcated by all practical writers, of securing both ends of a divided artery. Whenever this is practicable, it ought on no account to be omitted, but there are cases of dangerous hæmorrhage from stumps, from ulcerating or sloughing sores on the limbs, or from deep-seated arteries in the hands and feet, where a ligature cannot be placed, or will not hold upon the extremity of the bleeding vessel, and where the propriety of securing the artery in the upper part of the limb becomes a question.

Of this troublesome and dangerous hæmorrhage, examples are not uncommon in wounds of the lower part of the radial artery, where it dips between the metacarpal bone of the thumb and fore-finger. In two such cases I have successfully had recourse to the ligature of the humeral artery; and I have seen the same operation twice executed with success by others. This is a practice which some will think more honoured in the breach than the observance; and it has, I know, been said, that there is no hæmorrhage from vessels in the hand or foot, which may not be restrained by pressure. This I believe to be true; but, on the other hand, I believe it to be equally true that in certain states of a wound or ulcer the healing process will not go on, nor the closure of the vessel take place, under that degree of pressure which is necessary to suppress the bleeding; and it is by checking the flow of blood to the part, without irritating or inflaming the wound itself, that I believe the ligature of the artery above to operate successfully in such cases. In confirmation of this view of the matter, I would appeal to the authority of my former colleague, Mr. Liston, who, after adverting to the employment of pressure, goes on to observe, "that when this method fails, and when the case is more advanced, with pain,

swelling, and abscess, weakening of the circulation in the part is found to be effectual. The main artery is to be obstructed at a distance from the wounded part. It is needless to tie the radial, or the ulnar, or both; for still blood will be poured in by the interosseous and its anastomoses. The humeral must be secured in the middle of the arm, as has been practised in many instances, and with uniform success."

Here Mr. Liston seems to admit a distinction which appears to me to have been too much overlooked—the difference between a wounded and an ulcerating artery. In a valuable paper on arterial hæmorrhage, published by my late colleague Dr. Mackenzie, in the Monthly Journal of Medical Science for April 1852, we have the following observations bearing upon this point. After adverting to the practical rule of securing both ends of a divided artery so strenuously inculcated by Mr. Guthrie, Dr. Mackenzie remarks, "That exceptions occur in which the surgeon is compelled to trust to the Hunterian operation as the only means of arresting the hæmorrhage, no practical surgeon can doubt; and what appears most desirable at present is, that rules should be laid down by surgical writers, establishing as nearly as possible the circumstances in which the surgeon is justified in departing from the normal operation, and resorting to the uncertain means of arresting the bleeding by applying a single ligature to the artery at a greater or less distance on the cardiac side of the wounded point."

Besides the difference which has already been remarked in the facility and rapidity with which the superior and inferior extremities of a divided artery are closed, it would appear that there are particular arteries in which the process of closure is slower and less perfect than in others—in other words, there are some arteries peculiarly liable to secondary hæmorrhage. The following observations on this point are extracted from a concluding lecture which I had occasion to deliver to the students of Clinical surgery in the Royal Infirmary here several years ago. They refer to one of the cases in which the humeral artery was tied, after repeated failures to suppress a hæmorrhage from the radial artery by other means.

In speaking of this case, I illustrated it by a reference to numerous others in the writings of Gooch, O'Halloran, White, Hodgson, Guthrie, and Turner. "I observed that this case, however troublesome it had proved, was by no means singular nor even very rare. I showed you, that in one case quoted by Gooch, a young man lost his life in consequence of a wound of this artery; and that in another case, related by O'Halloran, after repeated hæmorrhages for a month, the limb was amputated. I find also that the frequency of secondary hæmorrhage from this artery was a circumstance which did not elude the comprehensive grasp of John Hunter's mighty mind. In a manuscript copy of notes from his lectures, in Dr. Knox's possession, Mr. Hunter mentions the radial and ulnar arteries as those, of all others, most prone to secondary hæmorrhage from ulceration of their coats; and my colleague, Dr. Campbell, has called my attention to a peculiarity in the situation of these two arteries, which is well worth noticing in any attempt to account for this. You will recollect that these vessels run for a considerable space on the lower part of the forearm, covered only by the common integuments above, and supported beneath by parts almost purely tendinous—the former circumstance rendering them more liable to injury, and the latter perhaps leading to their more frequent ulceration, in consequence of a less intimate and vital connection with the contiguous parts. But, to return to the fact, and to the particulars of Sutherland's case, you will recollect that I pointed out, on one of Rosenmüller's plates, the inosculations by which I conceived the repeated hæmorrhages in this instance to have been supplied, through the medium of what my late distinguished master, Dr. Barclay, has termed the ancono-carpal arch; formed by the anastomoses of the extreme branches of the interosseal with the radial and ulnar arteries on the back part of the carpus."

This case forces strongly upon our minds the singular revolution which has taken place in the opinions of surgeons relative to the ligature of arteries within the last eighty or ninety years. *They* were formerly afraid to tie any considerable artery, for fear of mortification of the limb; *we* are now apprehensive that the ligature of a main trunk may prove insufficient to suppress a hæmorrhage from one of its minor

branches. "When the brachial or femoral artery is wounded, though the patient should not perish by the hæmorrhage, the limb must soon die for want of nourishment." This was the language of Gooch in 1767. "When circumstances tending to prevent the establishment of a collateral circulation do not exist, we need not apprehend the death of any part in consequence of a deficient supply of blood after the ligature of its main artery." This was the language of Hodgson in 1815. And if you look into the accurate and instructive work of this author, you will find a case in which the ligature of the brachial was found insufficient to suppress a hæmorrhage from this same unlucky radial artery—the wounds of which, I may safely assert, have given more trouble to surgeons, and proved more disastrous to patients, than those of any other artery of a corresponding magnitude in the system. Surgeons have sometimes been made to pay in purse as well as in person for the mismanagement of such cases. Of this I recollect a remarkable instance which occurred in a provincial town in England not many years ago, where a surgeon was prosecuted and cast in damages at the suit of a cooper, who had lost the use of his arm, and was disabled from following his trade, in consequence of the tight bandaging employed to restrain a hæmorrhage from the radial artery. The case is strongly impressed upon my recollection by a very extraordinary coincidence; for while reading a newspaper report of it in the mess-room at Nottingham, where I was then quartered with the 33d regiment, I was called to the assistance of a soldier who had accidentally wounded his radial artery in whetting his razor; and having the fear of tight bandages fully before my eyes, I of course proceeded to secure the wounded vessel with ligatures." But to advert more particularly to the artificial means which have at different times been employed for the suppression of hæmorrhage—compression—styptics—the actual cautery—the torsion—and ligature of arteries.

Compression is a means of restraining hæmorrhage, the success of which must greatly depend upon the possibility of effectually accomplishing it, and this again upon the particular situation of the wound. When a subjacent bone affords a point of resistance, against which we may compress a bleeding vessel, any hæmorrhage, however profuse, may be restrained

in this way; but here it must often happen that the degree of pressure necessary to prevent the effusion of blood, if continued for any considerable time, and applied over the surrounding parts, has a tendency to excite violent reaction, and to endanger the destruction of the part by gangrene. As an immediate application to the bleeding surfaces of wounds, with the view of applying superincumbent pressure, *agaric*, *sponge*, or *charpie* are the articles chiefly employed. The former was introduced by a French practitioner, Mons. Brossard, surgeon at Chattre, in Berry. Several members of the Academy of Surgery were nominated by Martineau, surgeon to the King of France, to examine into the merits of Mons. Brossard's proposal for the suppression of hæmorrhage; and after a formal report on the subject by these gentlemen, dated at Paris the 7th May 1751, a pension was granted by the King to Brossard, although this remedy had been recommended by Felix Wurtzius 150 years before. The sponge was strongly recommended to the attention of the profession by the late Mr. White of the Manchester Infirmary, and is the medium of compression more generally employed by English surgeons. Into their respective merits I do not consider it worth while to enter, and shall conclude by observing that the sponge, if properly applied, is capable of giving all the security which this mode of practice can give. The sponge swells by the insinuation of the blood into its pores, and thereby exerts a gentle pressure in every direction; while the peculiar texture of the sponge favours a coagulation of the blood in the mouths of the vessels from which it flows. The sponge is not, however, to be trusted to when the orifice of the bleeding vessel can be distinctly seen, and may be included in a ligature; it is only applicable to those cases where an oozing of blood takes place from many small vessels which cannot be tied. Some foreign surgeons are said to trust entirely to compression for restraining the hæmorrhage from large vessels, even from the femoral artery, by placing the opposite flaps in contact after amputation of the thigh, and then securing them by a bandage. This is a practice, however, of which I have no personal experience, nor do I know that it has been adopted by any British surgeon. It seems a

practice to which there can be no occasion to resort, and in which there is no great reason to confide.

Of the *Styptics* used for the suppression of hæmorrhage, those recommended in former times were turpentine and alcohol; solutions of the sulphates of iron, copper, and alum; the diluted mineral acids; and the sulphate of copper, in a solid form, or what was termed the vitriol button, consisting of a portion of this salt wrapped up in a piece of cloth. In our own day, those which have been of most note are "Ruspini's Styptic," and the "Liquide Hæmostatique" of MM. Halmick and Talmagrand, the merits of which will not, I think, be estimated very highly, after the perusal of Mr. Hawkins' paper on this subject, in the Medico-Chirurgical Transactions of London. All these applications acting upon the principle of constringing the mouths of the bleeding vessels, or promoting the coagulation of the blood, are only applicable to superficial wounds, and here they are very generally unnecessary. "They are more advantageously applied in secondary hæmorrhages which arise from gangrene or ulceration, than in those which occur in fresh wounds, which it is generally an object to heal by the first intention,"—an object which will be more or less frustrated in all cases where it may be thought necessary to have recourse to astringent applications.

The *Actual cautery* was a means of suppressing hæmorrhage extensively used by the ancient surgeons; but the difficulty of regulating the heat so as on the one hand to produce an effectual suppression of the hæmorrhage, and on the other to obviate the too speedy separation of the eschar—a natural consequence of employing the iron too hot—were found to be powerful objections to the use of this remedy, even when it was most prevalent. As a means of suppressing hæmorrhage from recent flesh wounds it is now laid aside, its use being chiefly confined to cases of hæmorrhage within the mouth, and to the suppression of those bloody oozings which sometimes take place from bony surfaces, particularly in cases where exostoses have been removed.

The *Torsion*, or twisting the extremity of a bleeding artery so as to reduce it to a state somewhat similar to that in which we find arteries torn across without hæmorrhage, is a practice which has been recently introduced, and which I have seen

frequently employed in small-sized arteries. It is a practice, however, of which I have no personal experience, nor am I likely to have much while I see so few objections to the use of the ligature, and so much reason to be satisfied with the security which it affords. Torsion has been said to act less certainly on the smaller than on larger sized arteries, and hence, perhaps, the little progress it has made in this country. Mr. Alcock tells me that torsion was tried in fourteen consecutive amputations at Oporto, including one at the shoulder-joint, and that secondary hæmorrhage occurred only in one of them.

The *Ligature of arteries* is a practice which, if it possesses a superiority over every other in the surgery of civil life, is of still more importance in the treatment of those hæmorrhages which it often becomes the business of the military surgeon to suppress. Here we have no time to lose in trying successively various expedients for effecting our purpose. It is our duty to adopt at once the most speedy and secure, more especially as we are often destitute of intelligent professional assistants whom we might appoint to watch the wounded, and to whom we might intrust the patient's safety in the event of a renewal of the hæmorrhage. Above all, we are often uncertain how soon an exertion may be required on the part of the patient, totally incompatible with that tranquillity and repose so necessary to the success of all the other expedients for the suppression of hæmorrhage. Nothing can here be made too secure. We may be speedily compelled to move with our patients, or to move from them. In either case it will be well for us not to have trusted to a less certain mode of effecting our purpose, when a more infallible one was within our reach.

The best mode of tying arteries, and the immediate effects of the ligature, have been subjects warmly discussed by modern surgeons. From a series of experiments instituted in this place by the late Dr. Jones, he was led to infer that the first step of the process employed by nature in the permanent suppression of hæmorrhage was the effusion of a plug of coagulating lymph from the internal coat of the artery, and that this effusion was most certainly effected by the use of small round ligatures, the employment of which is followed by a division of the internal and middle coats of the vessel. So far Dr.

Jones was right. And the almost universal adoption of such ligatures, in this country at least, proves that the practice is in general amply successful; but when Dr. Jones asserted that it was only by the division of these two coats that such effusion of lymph could be produced, and a permanent suppression of the hæmorrhage accomplished, he evidently went a step too far. Various experiments and observations, among which those of the late Professor Scarpa hold a distinguished place, tend to prove, in the most unequivocal manner, that several modes of compression, which do not go so far as to divide the internal coats of an artery, may yet excite a sufficient degree of inflammation to lead to a permanent obstruction of its canal. We have instances of this from the use of broad ligatures, which were formerly employed with a view of obviating the very effect which Dr. Jones desired to produce; and we have instances, also, of the adhesive inflammation occurring, and uniting the opposite sides of an artery when they had been pressed together, and retained in contact by the pressure of an adjacent tumour. These considerations "cannot allow us to hesitate a moment about the rejection of Dr. Jones's assertion that a ligature will never be followed by a sufficient degree of adhesive inflammation within a tied artery, unless the inner coats of the vessel be divided by the cord." Instead of this sweeping inference, Dr. Jones should merely have concluded that such inflammation will generally take place after the ligature has had the effect described, and not that it cannot happen under other circumstances.

As a matter of fact, we know, that since the dissemination of Dr. Jones's views, and since the adoption of small ligatures by the generality of surgeons, cases of secondary hæmorrhage, from wounds, amputations, and operations for aneurism, have become much less frequent. This fact is worth a volume of reasoning on the subject, and with this fact we must rest contented, although Scarpa has, with much ingenuity, endeavoured to convince us that the division of the internal coats of an artery is more likely to produce ulcerative than adhesive inflammation in the cavity of the artery, since the solution of continuity caused by a small ligature rather resembles a lacerated and contused wound than an incision. He argues also with much plausibility, that the ligature, after cutting through

the inner coats, does not retain the margins or cut surfaces in reciprocal contact, but sinks between them, and only constricts the unbroken sides of the external coat.

In the London and Edinburgh Monthly Journal of Medicine for June 1843 will be found the results of some very interesting experiments upon the ligature of arteries, by Mr. Spence, one of my colleagues in the Royal Infirmary; and a series of preparations, illustrative of the facts recorded in that paper, are deposited in the Anatomical Museum of our University. Mr. Spence concludes that the deposition of an internal coagulum is not so essential a step in the closure of a tied artery as some writers would lead us to suppose; while many writers have overlooked, or very slightly noticed, what he believes to be, "if not an absolutely essential, at least a very uniform and important part of the process"—the deposition of coagulable lymph on the exterior surface of the artery. Mr. Spence has favoured me with a summary of his views upon this subject, of which I regret that my limits do not permit me to give more than the following imperfect abbreviation:—Lymph is effused in the interior and on the exterior of the vessel tied. In the interior, between the cut edges of the internal coats, and also on the internal surface of these coats; on the exterior of the vessel, compressing it in the vicinity of the ligature, acting as a medium of nutrition, gradually consolidating round the artery, contracting closer adhesions to, and ultimately becoming incorporated with its external coat; filling up the groove formed by the thread, and following in the track of the ligature as it ulcerates through the part on which it is immediately applied. "There is also another very important, though, at first sight, less obvious effect which the effused lymph will produce from its very first deposition—by its pressure it will diminish the calibre of the vessel, and thereby lessen the impetus of the blood in the neighbourhood of the ligature."

The original mode of securing arteries was with a needle and ligature, to which the foregoing observations do not apply; and for the employment of the needle, the following are the directions given by Paré:—"If the artery continue to bleed, cut up the wound if it has been sewed, and pass a needle under the artery, enclosing along with it in the liga-

ture much or little flesh, according to the circumstances of the case." There are, however, very few cases in which this mode of proceeding is now thought eligible. It is objectionable on account of the pain which it occasions, the great length of time which the ligature takes to separate, and the danger of hæmorrhage by the premature slackening of the ligature, from the wasting of the parts included in it. The needle has therefore been almost entirely superseded by the use of the tenaculum or artery forceps; with either of these instruments the extremity of the vessel is to be drawn out, and a noosed ligature, which may be previously placed loosely on the tenaculum, is slipped over its point, and tied upon the vessel by an assistant.

Of the different materials employed as ligatures for tying arteries, none seem to answer better than common, or dentist's silk—one or two threads of these being sufficient in ordinary circumstances for the largest vessels. With a view to the practice generally employed in this country, of laying together the lips of a recent wound, in expectation of their uniting by adhesive inflammation, it is of much importance to diminish as far as possible the quantity of extraneous matter left in the wound; and hence the diminution in the size of ligatures generally; the separation of the extremities of the ligature, and their disposal along the face of a wound or stump, so as not to impede the adhesive process; and above all, the removal of one-half of the ligature close to the knot, are steps which have been successively introduced into practice. The last, and by far the most important of these improvements, the removal of one-half of the ligature, is, I believe, due to Mr. Veitch, formerly of the Naval Hospital at Plymouth, whose own account of this practice is contained in a paper inserted in the second volume of the Edinburgh Medical Journal, under the title of the "Inquirer," a paper equally satisfactory and unassuming.

Towards the close of the late war, the practice of cutting off both extremities of the ligature close to the knot, was adopted by some of the army surgeons, and was warmly espoused by Dr. Hennen, who expresses himself strongly in favour of it. This practice, the origin of which appears to be due to Mr. Haire, a surgeon at Southminster in Essex, or

rather to a friend of his who had served with him in Haslar Hospital, has also been employed by Mr. Lawrence of St. Bartholomew's, who seems favourable to the practice. I had for several years been in the habit of representing the late Professor Delpech of Montpellier as an advocate for this practice, but from a conversation with that gentleman a short time before his death, I learned that he did not approve of the practice of cutting short the ligatures generally, but only adopted it on a particular occasion during the prevalence of hospital gangrene, when he considered it an object to heal all wounds, whether from operations or otherwise, as speedily as possible. Mr. Guthrie is strongly opposed to the practice of cutting off both ends of the ligature, and observes that he has in two or three instances seen ill-looking abscesses formed by the small portion of ligature left in the wound, and apprehends that disagreeable consequences may occasionally ensue from this practice. When two men of such consummate experience as Dr. Hennen and Mr. Guthrie are directly at issue, I do not consider myself entitled to speak with a tone of decision, particularly as my own experience of short-cut ligatures has been mostly confined to cases in which an immediate cure by adhesion was either not attempted, or, owing to some untoward occurrence, was not obtained. But of the bad consequences pointed out by Mr. Guthrie, I have lately seen a remarkable instance in the person of one of my professional brethren here, where the ends of the ligature employed to secure an artery which was accidentally wounded in the hand were cut off, and where the wound repeatedly festered, and did not ultimately heal until the ligature was discharged at the end of several weeks.

Whatever may be the surgeon's intention as to the disposal of the ends of the ligatures, it should be his study, in securing blood-vessels, to avoid including in the ligature the nerves which accompany the arterial trunks. The tying of these is apt to occasion startings of the limb, or in irritable habits, even general convulsions. The secondary hæmorrhage, which occasionally occurs in gunshot wounds of the extremities, we shall have occasion to consider more particularly hereafter. In the meantime I may remark, that its frequency has been overrated; and I shall conclude these general re-

marks on hæmorrhage in the words of Mr. Samuel Cooper, who observes, "that no other plan of preventing bleeding from large arteries is so secure as the ligature, because no other makes such direct pressure on them, nor acts with so little chance of being displaced." "For the good of mankind," says Paré, "and the improvement and honour of surgery, I was inspired by God with this good thought." And appreciating fully as we now do the utility of his invention, we cannot but look back with astonishment at the time when Paré was reduced by the idle and impertinent clamour of Gourmalin, president of the Parisian College of Physicians, to search the writings of Hippocrates, Galen, and Avicenna, for traces of the use of the ligature, as a justification of his practice. "By this measure," says Mr. Samuel Sharpe, "he would have given away the glory due to his discovery; but it was not in his power either to benefit his cause or to injure his reputation by such a proceeding."

ANEURISM.

Having considered the process followed by nature, and the means employed by art for the suppression of hæmorrhage, it becomes necessary to advert to the disease termed aneurism—a disease originating in some of its forms without external violence, but in others a direct consequence of wounds or lesions of the arterial system. The term aneurism is employed to denote a tumour more or less circumscribed, occurring in the course of an artery, and has generally been defined as a soft pulsating tumour. This is a character which in its earlier stages it must always possess; but in proportion as the tumour increases in bulk, and the surrounding parts become involved, this pulsation often becomes obscure, and sometimes it is altogether lost. Previously to the discovery of the circulation, and the minute investigations of morbid structure, which distinguish the recent annals of our profession, the pathology of aneurism was very imperfectly understood, and the practice proportionally inefficient. In

recent times, again, the consideration of this subject has perhaps been rather obscured than elucidated by refined and exclusive views as to the structure of aneurismal tumours; by dwelling upon shades of difference not distinguishable during life, and of no moment in practice; and by the introduction of terms which, from being variously used by different writers, have led to discrepancies of opinion perhaps more apparent than real. It will, I think, afford a view of this subject sufficiently comprehensive to embrace all the principal varieties, and at the same time sufficiently minute for every practical purpose, if we look upon all aneurismal tumours as formed in one or other of the three following ways: either by a preternatural dilatation of the coats of an artery; by a breach in one or all of these coats proceeding from within outwards; or by a wound penetrating the coats from without inwards, and giving room for the immediate escape of blood into the contiguous cellular membrane.

The first comprehends partial dilatations, which have occasionally been observed in some of the larger arteries, and also that form of disease to which, in my opinion, the term *varicose aneurism* ought to be restricted, in contradistinction to *aneurismal varix*. That morbid dilatations in the course of the large arterial trunks, without any obvious change of structure in their coats, do occasionally occur, is admitted by all writers on this subject; and while some authors give the name of aneurism to such dilatation, others contend that aneurism is in all cases necessarily preceded by a breach in the internal and middle coats of an artery. This is the opinion of the distinguished Professor Scarpa, who acknowledges a state of preternatural dilatation in the whole circumference of an artery, and mentions the frequency of its occurrence in the ascending aorta; but at the same time considers this as differing from aneurism, although he admits that the two diseases frequently exist in the same vessel. Of this circumscribed dilatation, or aneurismal swelling in the course of an artery, examples are occasionally met with on dissection in the course of the thoracic aorta, and I have seen two examples in the living body, of what I believe to be similar swellings at the root of the common carotid. Both of these cases, one of them in the person of a medical man, have

remained nearly stationary for years, and do not easily admit of, nor seem to demand, any remedial treatment. The disease which I would term varicose aneurism consists in a preternatural and tortuous dilatation of the branches of an artery, observable chiefly in the scalp, or in vessels lying superficially, and giving them a resemblance to the disease of the venous system termed varix. Of this interesting examples are recorded by Pelletan, Wardrop, Syme, MacLachlan, Hager, and others; but as the varicose aneurism, as well as the *aneurism by anastomosis*, is generally, if not always congenital, and of course ought to be a reason for excluding any individual affected with it from military service, it is foreign to my purpose to enlarge on its nature or treatment.

The second description of aneurism is formed by a breach in the coats of an artery, originating in the interior coat, and proceeding outwards. It comprehends the greater number of spontaneous aneurisms, and is described by Scarpa, Hodgson, and others, as the *true* aneurism. Its principal varieties are the circumscribed and diffused—circumscribed so long as the external coat remains entire, forming the sac of the tumour, and diffused when in the progress of the disease this coat has given way, and when the contiguous parts become the boundaries of the swelling. It appears that when the internal and middle coats are destroyed, the sac is in the first instance formed by an expansion of the external coat of an artery. As the distension advances, this coat gradually gives way; the sheath of the vessel then restrains the effusion; and this yielding in its turn, the surrounding parts, whatever may be their texture, form the boundaries of the extravasation. In the early stage of the disease either the whole cylinder of the vessel, or only a part of its circumference may be dilated; but at length, in consequence of the increasing distension, some of the coats of the artery possessing the least elasticity give way, and these are found to be the internal and middle coats, while the external one still makes resistance, and continues to be more dilated by the impulse of the blood.

In the advanced stages of external aneurisms the skin becomes extremely thin, and incorporated as it were with the aneurismal sac. The cavities of the cellular substance con-

tiguous to the disease are either filled with serum, or totally obliterated by adhesion. The adjacent muscles, whether lying directly over the aneurism or on its sides, become displaced, stretched, wasted, and confounded with the other parts. The nervous cords passing over the circumference of the tumour, are in the same way pushed out of their natural position, and are sometimes found adhering to the outside of the sac, so altered as scarcely to be recognised. Finally, the cartilages and the bones themselves become involved in the mischief which the aneurismal swelling produces; they are gradually destroyed, and at length no trace of their substance remains. Such is the usual progress of internal aneurisms, or of those originating in the limbs without any obvious injury. The internal and middle coats of an artery may be destroyed by absorption, ulceration, or rupture; but neither of these are, I believe, liable to occur in arteries until their coats have undergone some previous morbid alteration. They frequently take place in arteries, the coats of which contain atheromatous or calcareous depositions. The internal coat first gives way, the destruction of the middle follows, and is accelerated by the infiltration of the blood amongst its fibres. The external coat becomes incapable of resisting the force of the circulation, and yields so as to form the sac of the aneurism. I may here mention a singular opinion of Baron Larrey as to the cause of some aneurisms, which he distinctly ascribes to a syphilitic virus giving rise to ulceration of the internal coat of the artery; and he narrates some cases in which the exhibition of mercury is said to have been followed by a diminution of the dilatation of the artery. Larrey's observations coincide with those of Scarpa and Sabbatier as to the formation and increase of the tumour, and his experience I find coincides with my own as to the infrequency of aneurism in what may be termed its spontaneous or idiopathic form amongst soldiers.

Such is a general outline of the structure and progress of aneurismal tumours, formed by a breach of the interior coats of the artery; but we find considerable variety in regard to the extent of the aperture in the coats, and the relation which it bears to the aneurism. In some instances, particularly of small aneurisms, the destruction of the internal and middle

coats is equal in extent to the base of the swelling, which projects from the side of the vessel in a semi-globular or semi-ovoid form. In other cases, the blood insinuates itself between the external and internal coats of the artery, separating them from each other to a considerable extent, and leaving the communication with the canal of the artery small in proportion to the exterior tumour projecting from it. This is what Mr. Guthrie and others have termed the dissecting aneurism, in which the interior and middle coats may be looked upon as forming an incomplete partition, or septum between the artery and the aneurism, nearly akin to that which is formed by the iris, between the anterior and posterior chambers of the eye. In some rare instances, two of which are described by Mr. Shekleton of Dublin, it would appear that the blood, after having insinuated itself between the external and middle coats of the vessel, and separating them to a considerable extent, had again found its way into the tube of the artery. But it seems unnecessary for my purpose to enter farther into these varieties. They are chiefly observed in aneurisms of the large arteries within the trunk of the body. They cannot be known during life, and consequently can lead to no peculiar nor efficacious practice.

The third and only remaining form of the principal divisions of aneurism which I have adopted, is that occasioned by an external wound penetrating all the coats of an artery, and giving vent to the blood. This is the only form of the disease likely to be frequent among soldiers or seamen. It has been termed the *spurious*, *false*, or *traumatic* aneurism, and, like the true aneurism, may be subdivided into circumscribed and diffused—the former implying a concentrated tumour encysted in condensed cellular membrane immediately contiguous to the wound; the latter a diffused swelling formed by extravasated blood escaping from the wound, and extending upwards and downwards along the course of the limb. This tumour originates always from the wound or puncture of an artery, and in the circumscribed form is often occasioned in the following manner :—When pressure has been made in the first instance, so as to suppress the hæmorrhage, but the bandage has afterwards been removed too soon, before the artery has healed, the blood passes through the unclosed wound into the cellular

substance. As this has now become agglutinated by the preceding pressure, the blood cannot diffuse itself into its cells, and consequently a mass of it collects in the vicinity of the aperture in the artery, and distends the cellular substance into the form of a sac. Sometimes, though not often, this circumscribed false aneurism originates immediately after the opening is made in the artery. This chiefly happens when the aperture in the vessel is exceedingly small, and consequently when the hæmorrhage takes place so slowly, that the blood which is first effused coagulates, and prevents the entrance of that which follows into the cells of the cellular membrane, and of course its diffusion. Of this species of aneurism numerous examples occur from punctured wounds.

The diffuse form of traumatic aneurism has, in those instances in which I have seen it, been accompanied with fracture of the bone and extensive injury to the limb—has in fact been generally occasioned by a laceration or wound of the artery from some prominent point of bone, and followed by extensive disorganization of the soft parts. Besides the forms of circumscribed and diffused, which the traumatic aneurism possesses in common with others, it admits of two very remarkable varieties originating from the circumstance of the wound in the artery being in some cases inflicted through a superincumbent vein. One consequence of this, described by authors, is the formation of a circumscribed false aneurism, or encysted bloody tumour, in the cellular membrane lying between the artery and vein, communicating by one aperture with the artery below, and by another with the vein above —a variety of the disease which, when speaking of this subject in my class, I have been in the habit of terming the *intervascular* aneurism, and of which interesting examples are given by Dorsey, Liston, Syme, and others. But the more common result of a wound transfixing a vein, and making a communication between it and the subjacent artery, is that the blood from the artery is forced with impetus into the vein; the latter becomes distended and varicose; a pulsatory motion is now communicated to it, and a stridulous or ringing noise is to be heard on applying the ear or stethoscope to the site of the wound. This disease is most frequently caused by inexpert bleeding at the bend of the arm. It constitutes what, in my

opinion, ought to be called *aneurismal varix*, in contradistinction to *varicose aneurism*. These two terms have been in some measure promiscuously used by authors; but nothing can, in my judgment, admit of a more natural or perfect distinction. The disease formerly described should be termed aneurism, inasmuch as it is a swelling or distension of the artery; the latter should be termed varix, inasmuch as it is a swelling or distension of the vein. Sometimes, indeed, we have a combination of the intervascular aneurism and aneurismal varix—a portion of the vein dilated contiguous to the opening, while, at the same time; an aneurismal cyst is formed between the two vessels.

We are now, I think, prepared to understand what are usually considered as the diagnostics of aneurism. The occurrence of a pulsating tumour near a large artery is always a sufficient reason for suspecting the disease to be aneurism; but as other tumours or even abscesses in the vicinity of an important artery sometimes have a throbbing motion communicated to them by the neighbouring vessel, no positive judgment should be formed until other circumstances of the case have been duly considered. An aneurism in an external situation, such as those referred to in the carotid, and consisting in a dilatation of all the coats of an artery, presents itself at first in the form of a pulsating tumour, which subsides under pressure, and immediately reappears when the pressure is removed. It also subsides, or at least becomes more flaccid, when the portion of artery between it and the heart is compressed, but immediately resumes its original fulness when such compression is discontinued. This aneurism, in its commencement, is not painful, and the integuments are of their natural colour; the pulsations are strong, particularly in the earlier stages of the disease, and when the coats are yet entire. When the inner tunics are destroyed, and the external coat alone dilated, the communication between the canal of the artery and the cavity of the aneurism, is generally more direct and capacious than in a false aneurism; and therefore the pulsation of the tumour is stronger than in the latter case. The symptoms of a circumscribed false aneurism are not materially different from those above stated; but it is to be observed that a true aneurism generally yields to pressure, and recurs on its discontinuance, while a

false one yields with difficulty, and the swelling returns very gradually. These circumstances are plainly referrible, first, to the diversity in the size of the direct communication between the aneurismal swelling and the canal of the artery; and, secondly, to the circumstance of the blood being often more or less coagulated even in the early stages of the circumscribed false aneurism. With respect to the diffused false aneurism, it generally presents but a feeble and indistinct degree of pulsation, except close to the aperture in the artery. In consequence also of the extensive injection of the cellular membrane with blood, the case is at the same time attended with more discoloration than any other form of aneurism unaccompanied with inflammation. The history of the disease, its causes, its sudden formation, &c., also tend to assist us in the diagnosis, and are to be carefully considered.

These tumours, like abscesses, generally proceed towards the surface of the body; but in this respect they are much influenced by the situation and by the side of the vessel from which they originate. When the sac points externally, it rarely or never bursts by laceration; but the extreme distension causes the integuments and investing parts to mortify; and upon the separation of the slough, the blood in general issues from the tumour. There are, however, cases in which, after the sloughing of the integuments, life has been for a time preserved by the lamellated coagulum within the aneurismal sac closing the aperture, and preventing the escape of the blood. Of this I saw a very remarkable case in Sir Patrick Dun's Hospital several years ago, the particulars of which were subsequently transmitted to me by Dr. Montgomery of Dublin. Some arteries are less liable to those diseases in their coats which predispose to the formation of aneurism than others. In the pulmonary artery this disease is extremely rare. The arteries of the arm are much less frequently diseased than those of the trunk or lower extremities. And Mr. Hodgson remarks, that he has never seen an aneurism which was not produced by accidental violence in any branch of the axillary artery. Aneurisms rarely arise from arteries of the fourth order, as the radial, the ulnar, the tibials, &c., or from their ramifications, unless produced by accidental violence.

Before proceeding to speak of the treatment of aneurism,

I may remark, that this formidable disease, in some rare cases, undergoes a spontaneous cure; and this happens in one of the following ways:—

1. By sphacelation—a sphacelation, however, which must not be confined to a portion of the sac, as in the above-mentioned case, but a sphacelus which, in consequence of a preceding attack of inflammation, embraces the whole sac and a portion of the surrounding parts. If the inflammation extends to a sufficient depth, a portion of the artery on either side of the aneurism becomes blocked up by the coagulating lymph, and thus the patient is saved from a fatal hæmorrhage on the separation of the slough. Of this mode of cure several instances have been noticed; but perhaps the most remarkable is one which occurred in the York Hospital, in the person of a soldier, and which is given in detail in Mr. Hodgson's valuable work.

2. By the progressive increase of the tumour, it comes in some degree to press upon and obstruct the portions of the artery immediately contiguous to it, and has been supposed in this manner to prove its own cure. Of this I am not aware that there is any satisfactory example on record; but it does not seem impossible that some of the unexpected and unexplained cures which have occasionally been observed may have occurred in this manner. There are instances of the canal of an artery becoming obliterated in consequence of the pressure of a contiguous tumour, whether aneurismal or not, and there is a remarkable instance noticed by Mr. Liston, in which one aneurism proved in this way the cure of another.

3. The process, however, to which we are encouraged to look for the cure of aneurism is by the deposition of coagulum within the sac, and the contiguous portions of the artery, the consequent obstruction of its canal, and the preservation of the limb by the collateral circulation. In some rare cases of aneurism of the aorta, which have undergone a spontaneous cure, this has been effected by the deposition of a fibrous coagulum, occupying the whole cavity of the sac, but without extending itself into the canal of the artery. But the more common manner in which aneurisms are spontaneously and often artificially cured is this—the cavity of the sac becomes

gradually filled with layers of coagulum, and the circulation through the artery is ultimately prevented by the extension of this coagulum into the canal of the vessel. The blood being forced by this means into the collateral arteries, the coagulum is again gradually absorbed, and the artery and the sac contract until the one assumes the appearance of a ligamentous cord, and the other that of a small fleshy tumour. In all artificial attempts towards the cure of aneurism, we have it in view to assist nature in accomplishing the cure by this last-mentioned process, by the deposition of coagulum in the sac and in the artery, leading to a permanent obstruction of its canal, and leaving the blood to find its way to the more distant parts of the limb by the anastomosing vessels.

The treatment of aneurism may be divided into medical and surgical; the former consists essentially of bleeding, low diet, and abstinence from all excitement of the vascular system by exercise or otherwise, and is the only means we have in our power of promoting the cure of internal aneurisms. The surgical treatment of this disease, applicable to aneurisms of the extremities, consists of pressure; or of an operation by which the trunk of the artery is laid bare and tied, the flow of blood into the sac moderated or obstructed, and a facility given for the formation of the coagulum, by which the cure is finally accomplished. There are now many cases recorded in which compression has effected a cure. This mode of treatment has recently been recommended on the very high authority of Mr. Liston, and has been strongly advocated by Dr. Bellingham, and other eminent surgeons in Dublin; but I have not sufficient experience of the practice to entitle me to speak of its efficacy. I have great pleasure, however, in referring to some excellent "Practical Remarks on the Treatment of Aneurism by Compression," published by my fellow-labourer, Mr. Tufnell, the lecturer on Military Surgery in Dublin. In this work the author has given an interesting history of this mode of treatment in the Irish metropolis since its introduction in 1820; has given much judicious advice as to the treatment of the disease generally; the manner of conducting the pressure, with figures of the apparatus most successfully employed; and has added, in a tabular form, a return of cases of aneurism treated by compression in Dublin.

from October 1842 to March 1851, amounting in all to thirty-nine, in thirty of which the cure has been "perfect and complete."

Prior to the year 1785, the operation practised for the cure of aneurism was pregnant with difficulty and danger, so much so, that Mr. Pott, after forty years' practice, declared that until a better mode of treating the disease was discovered, amputation was the only resource in cases of popliteal aneurism. The operation formerly consisted in cutting open the tumour, clearing it of its contents, and tying the artery at each extremity of the sac. The method was first adopted by Severinus and Trullus about the year 1646, in a case of aneurism in the thigh; and subsequently to them by several surgeons in France, Germany, and Italy. The first operation of the kind performed in this country was by Mr. Burchall, at the Manchester Infirmary, in 1757; an account of which is to be found in the third volume of the "Medical Observations and Inquiries." The frequent failure of this operation caused it to fall into disuse, and amputation of the limb was substituted, until John Hunter's improvement superseded the necessity of so desperate an expedient. The modern operation for aneurism was first performed in 1785 upon a coachman, a patient in St. George's Hospital, labouring under popliteal aneurism. The main trunk of the artery was tied in the thigh, the points gained by which were the obliteration of the calibre of the vessel communicating with the aneurismal sac, so as to cut off the supply of blood to the tumour, and thereby to allow the diseased mass to be removed by absorption.

The point of election for tying the femoral artery is where, in its course downwards, it comes to be overlaid by the sartorius muscle, or about the junction of the upper and middle thirds of the thigh. In some rare cases, of which a beautiful example is given in the lithographs from the Museum of the Medical Department at Chatham, this operation has failed in consequence of the blood having been too freely returned by the anastomosing vessels into the tube of the main artery, between the ligature and the aneurism. After the main artery of a limb has been secured by ligature, the blood finds its way to the parts below the obliterated point by means of the anastomoses, or communications which exist between the final rami-

fications of arteries, and which, in all aneurisms of the extremities, have been proved to be sufficient to carry on the circulation.

Mr. Hunter's operation, which was nearly anticipated by Ætius, is now every day practised with success in the common form of aneurism from ulceration or rupture of the interior coats of an artery, but it is much less applicable to the false aneurism occasioned by a wound of the artery. Here, although the trunk of the artery may be tied above, the wound in it does not heal, and the aneurismal tumour frequently suppurates, ulcerates, or sloughs. Of this I have seen three or four remarkable instances, two of which occurred within a recent period. The ligature of the artery in the region of the humerus failed in these two cases to cure the aneurism, and each of them was afterwards treated successfully by laying open the tumour, turning out its contents, and placing a ligature on the artery above and below the wound. I have therefore, latterly, upon all occasions, opposed Mr. Hunter's operation for this form of aneurism, and recommended the old mode of operating. That variety of aneurism which occurs from an artery being wounded through a superincumbent vein, and where the tumour lies between the two, I can only consider as a modification of the common false aneurism, and to be treated by tying the artery, and perhaps the vein also, above and below the tumour, as was done in Dorsey's case. In cases of aneurism situated so as to render it difficult or impossible to place a ligature on the artery between the aneurism and the heart, attempts were formerly made, and have recently been revived, to cure the aneurism by placing a ligature on the artery beyond the tumour. Of this practice I have no personal experience, nor do I place much confidence in it.

The aneurismal varix, it will be recollected, is formed by the healing of the external wound in the skin, while the arterial blood, in consequence of the proximity of the two vessels, instead of being effused into the cellular substance, passes directly into the cavity of the vein, which becomes dilated in the form of a varix. This disease, which was first accurately described by Dr. William Hunter, occurs not unfrequently from blood-letting at the bend of the arm. It is

a disease occasionally incident also to soldiers from punctured wounds, of which several remarkable instances are on record; and it has, I may say, been treated most successfully when least has been done in the way of operation. All that is required is to support the swollen vein, as in other cases of varix, with a roller or elastic bandage; and in several instances, I have seen patients going about for years, and sometimes following laborious employments, without even this precaution. We know, from cases recorded by Scarpa, Hunter, Benjamin Bell, Pott, and Garneri, that cases of aneurismal varix have remained stationary for twenty or thirty years; while in others, cures have been obtained by judicious compression. It is therefore chiefly with a view to prevent any hasty or ill-judged operation of tying the artery, that I am induced to notice particularly this form of aneurism; and to recommend a careful comparison of some cases of this kind treated successfully by Baron Larrey without ligature, with one recorded by Dr. Hennen, in which, in an evil hour, contrary to his advice, a ligature was placed upon the common femoral artery in a case of aneurismal varix in the thigh, and speedily followed by the death of the patient.

But while any precipitate or uncalled-for operation is to be deprecated in this form of the disease, I would earnestly urge the early performance of the operation in the more usual species of aneurism. Nature has made provision for a circulation sufficient to support the life of the member, even where the main artery of a limb has been tied. And the following are the practical inferences deduced by Mr. Hodgson from a very full consideration of this subject:—"1st. That the circulation will be as effectually carried on in a healthy limb when the main artery is suddenly tied in consequence of a wound, as when an aneurism has existed for a considerable time. 2d. That the practice of permitting an aneurism to increase, that the collateral branches may become enlarged, is not only unnecessary but injurious, inasmuch as the increase of the tumour must be attended with a destruction of the surrounding parts, which will render the cure of the disease more tedious and uncertain." Concurring entirely in Mr. Hodgson's views upon this point, there appears to me no room for delay in the application of the ligature, particularly after the satis-

factory results which I have seen from this operation, both in my own hands and in those of others. I do not wish to express an opinion unfavourable to the mode of treatment by compression, of which I have had so little experience; but when the ligature of the artery is resolved upon, my advocating an early operation will not be matter of surprise, when it is stated, that, while in the whole course of my life, I have seen only two aneurisms cured by compression, I saw, within a period of two years, three cases terminate fatally in consequence of ulceration of the sac after the artery had been tied—an event which might, in my opinion, have been obviated, had an earlier opportunity been afforded to the surgeon of performing the operation. In a fourth case, which occurred in a dragoon in our cavalry barrack, contrary to my opinion, and contrary to the opinion of the gentleman whose duty it became to operate, the operation was, by the doubts and indecision of some of the gentlemen concerned, delayed for nearly three weeks, during which the tumour in the ham was observed growing day by day; and the patient in consequence made a less perfect recovery than he otherwise might have done.

WOUNDS OF THE NERVES—TETANUS.

Wounds of the nerves, although, in the first instance, less alarming and less hazardous than those of the arteries, are not less formidable in their after consequences. Aneurism is an infinitely more manageable disease than tetanus, one of the most severe and one of the least remediable consequences of wounds.

Nerves, like other parts of the system, are found capable of reuniting when divided by wounds; and even when a small portion of a nervous trunk is removed, its continuity may be restored, and its functions re-established. This is proved by the experiments of numerous authors, as well as by the frequent failure of the operation for *tic douloureux* in the human subject, and of the operation termed *nerving* in horses. The observations of Haighton and Swan, of Larrey and Tiedemann, embrace

everything that is valuable on this subject, and contain many minute and interesting details of the manner in which nerves are reunited or regenerated. But as these are processes entirely dependent upon the efforts of nature, and for the promotion of which no artificial means are adopted beyond the general and accurate approximation of the lips of a wound, the following remarks are confined to the consequences supervening upon injuries of the nerves, and not to any surgical expedient for restoring the continuity of a nervous trunk.

The only case in which I have seen this attempted, was in a patient operated upon by Dr. Simpson of this city. In this interesting case, the median nerve had been cut across by an accidental wound above the wrist; the superior end of the divided nerve was to be felt distinctly through the integuments immediately above the transverse cicatrix; its extremity enlarged and bulbous, the motion of the correspondent thumb, fore, and middle fingers greatly impaired, and their sensation quite lost. Both extremities of the nerve were laid bare by a longitudinal incision; the knot or bulb, which exactly resembled that formed on the extremities of nerves after amputation, was removed from the upper end; the lower end was disengaged from the cicatrix in which it was involved, and its extremity pared off. The two ends were then approximated as much as possible, but this was very imperfectly accomplished; for on bending the wrist with this view, and throwing the muscles of the forearm into action, it was found that the superior portion of the nerve was drawn upwards along with them. The external wound healed kindly, but the nerve did not reunite; and a bulbous knot, similar to what existed before the operation, has again formed upon its upper extremity.

Many anomalous and distressing symptoms arise from wounds involving the lesion of nerves. One of the most frequent results is the formidable disease named *Tetanus*, an affection which consists in a more or less violent and extensive contraction of the muscles of voluntary motion, attended with tension and rigidity of the parts affected. When its effects are confined to the muscles of the jaw or throat, as is often the case, it is termed *trismus* or locked jaw; when the whole body is affected and becomes rigid, but not bent or distorted, the case is more particularly denominated *tetanus;* when the body is

bent forwards, *emprosthotonos*, and when backwards, *opisthotonos*. Other subdivisions marking the particular seat and extent of the disease have also been employed by authors; but distinctions more to our present purpose are those into chronic and acute, and into idiopathic and traumatic tetanus. The idiopathic form of the disease is a very rare occurrence in temperate climates; a warm and moist atmosphere are considered as predisposing to it, and it arises more immediately from cold suddenly applied or long continued. Exposure to the night air during sleep, and sudden transitions from heat to cold, are occasionally found to produce it. In our West India settlements it is a common occurrence both in its idiopathic and symptomatic forms; but my own experience in the East Indies does not lead me to consider it so common an occurrence in that climate as some authors would induce us to believe.

It appears, however, that the frequency and severity of tetanus differs greatly even in similar latitudes and localities, from circumstances not always easily explained. I have frequently expressed my surprise and satisfaction at the results of the wounds which we had occasion to witness at the taking of Java in 1811, and from a memorandum kept by the late Dr. Badenach, who was then assistant-surgeon of the 59th regiment, I am enabled to state, that out of 150 Europeans wounded at the attack of Fort Cornelius near Batavia, only one tetanic case occurred; while from the same gentleman I learn, that in a small detachment which proceeded to Macassar, out of eight or ten men wounded, two died of tetanus; and it appears from an essay, published in 1817 by Mr. Schaw, that he had occasion to witness a large proportion of tetanic cases amongst the wounded Europeans and sepoys employed in a successful attack upon Sambas, a piratical Malay town in the island of Borneo. In all tropical climates, wounded persons, particularly if exposed during the night, are liable to be attacked by tetanus. It is said to be particularly apt to supervene upon contused, lacerated, and punctured wounds about the fingers and toes or other tendinous parts, upon gunshot wounds in the course of the nerves, and upon injuries of the joints.

Baron Larrey has observed the frequency of this disease in Egypt, where he says that "this affection was more intense.

and bore a greater resemblance to hydrophobia, than in the colder climate of Germany." Exposure to the cold, moist, nocturnal air, he found particularly conducive to it, and that it was most prevalent in damp situations adjacent to the Nile or to the sea. In speaking of the traumatic tetanus, Baron Larrey remarks, that when it originated from wounds injuring nerves on the fore part of the body, *emprosthotonos* was occasioned; when the posterior nerves were hurt, *opisthotonos;* and that when the wound extended quite through a limb, so as to injure equally both descriptions of nerves, complete *tetanus* ensued. Larrey's remarks upon this point have hitherto been so little supported by the experience of others, that I am particularly desirous to turn the attention of future observers to his statements regarding the causes and comparative frequency of the different forms of this disease; and that there may be no risk of misrepresenting the Baron's views, the following passage is introduced from the first volume of his Clinique Chirurgicale :—

"Dans les blessures qui causent le tétanos traumatique, si ce sont les nerfs de la région antérieure du corps qui ont été lésés, j'ai remarqué qu'il en résulte l'emprosthotonos; que l'opisthotonos au contraire a lieu lorsque ce sont les nerfs de la région posterieure qui ont reçu la lésion, et qu'enfin si la cause vulnérante a traversé un membre de manière à attaquer également les deux plans de nerfs, le tétanos complet s'établit, en jetant l'individu dans une rectitude totale."

The attack of tetanus is for the most part sudden, and without any premonitory symptom; it is sometimes, however, preceded by lassitude and uneasiness, want of sleep, faintness, and dimness of sight, frequently also by constipation of the bowels. There is a peculiar dejection and anxiety of countenance from the commencement of the attack. The patient complains of a sense of tightness about his jaws; the muscles moving the lower jaw become rigid and constantly contracted; deglutition becomes difficult, and, the spasms increasing and affecting the muscles of the tongue, it is sometimes forcibly protruded between the teeth, and not unfrequently bitten through. The spasmodic affection gradually reaches to the neck and back, and the whole body becomes affected with rigid spasm. In one memorable instance mentioned by Baron Larrey, a spasm so violent as to have ruptured one of the recti

muscles is said to have been induced by plunging the patient suddenly into a cold bath. A shooting pain is experienced from the ensiform cartilage towards the spine, and this is held to be a pathognomic symptom of the disease—almost every writer on this subject having mentioned it, from the time of Hippocrates downwards. When patients labouring under tetanus have arrived at their worst stage, they very often have a great aversion to liquids, and if forced to swallow them, convulsions are almost immediately excited; hence the analogy which has been frequently remarked between this disease and hydrophobia. But in two points these diseases, as they have fallen under my observation, exhibit a considerable difference. While in cases of hydrophobia, the mind appears agitated and acutely sensible to every external impression, it is in many cases of tetanus perfectly tranquil, firm, and undisturbed, even until death. In most cases of hydrophobia, the pulse is quickened, and other febrile symptoms present; whereas, in many instances of tetanus, the pulse, unless previously raised by the injury whence the tetanus originates, deviates little or nothing from a natural standard.

Dr. Parry, who has published some cases of tetanus and rabies contagiosa, is of opinion that we may estimate the danger in proportion to the quickness of the pulse, and observes, that "If in an adult the pulse by the fourth or fifth day does not reach a hundred beats in a minute, I believe the patient almost always recovers; if, on the other hand, the pulse on the first day is one hundred and twenty or more in a minute, few instances, I apprehend, will be found in which he will not die." This, however, is not consonant to the observation of others. Thus, Dr. Morrison of Newry, who practised several years in Demerara, and saw numerous instances of the disease in that colony, says—"I recollect the pulse, in the absence of spasm, at ninety-eight in a boy who fell a victim to the disease on the third day; but I cannot say that I have ever remarked it higher than this, either in cases which terminated fatally or in those which recovered." Dr. M'Lagan, Physician to the Forces, in an excellent essay upon tetanus, remarks—"As far as I have been able to learn, either from my own experience or that of others, there is no disease in which the pulse can less safely

be taken as a guide, as to its probable event. In many cases of tetanus, indeed, the pulse, except during the violence of the paroxysm, or towards the fatal termination of the disease, is little affected."

This is so perfectly coincident with my own experience, that I cannot but look upon the pulse as affording us very little assistance in forming a prognosis. The violence, extent, and duration of the spasms—the sudden accession of the disease, and the rapidity of its increase, are the circumstances which should lead us to an unfavourable prognosis; while its more gradual approach—the spasms being more circumscribed and confined to fewer muscles—the remissions more frequent and of longer continuance—the patient enjoying sound sleep—the cutaneous, the fæcal, and urinary secretions continuing natural, or obedient to the powers of medicine, are the circumstances which, in a few—a very few—cases forbode a favourable termination.

Although tetanus has been considered as more peculiarly incident to punctured wounds in tendinous parts, yet it occasionally supervenes upon every variety of wound, from the most slight and simple, to the most severe and complicated, in every kind of texture, and in some cases even where the injury has been so slight as to pass unnoticed. Four remarkable cases, three of them fatal, have lately been mentioned to me by an experienced army surgeon; in two of these tetanus supervened on superficial abrasions scarcely penetrating beyond the cuticle; in a third, on a slight scratch from a razor in shaving; and in the fourth, upon the wound made in tapping a hydrocele. There is unfortunately nothing generally remarkable in the state and progress of wounds which can lead the most attentive observer to anticipate the attack of the disease, and its invasion occurs also at periods very uncertain. In Rees' Cyclopædia a case is recorded, on the authority of the late Professor Robison of this University, in which a negro who had scratched his thumb with a broken china plate, is said to have died of tetanus in a quarter of an hour after this slight injury; but the more usual period of its attack is from the *fifth* to the *twentieth* day. Sir J. M'Grigor, in his paper upon the health of the Peninsular army, states, as the general result of the experience of that army, "that if

tetanus does not occur for twenty-two days from the date of the wound, the patient is safe." This statement was, I believe, made on the authority of Mr. Guthrie, who, in a letter to me, questions the occurrence of tetanus at a later period than this after a gunshot wound, and without other cause. Instances, however, of which two are noticed in Mr. Curling's essay, have occurred of its supervening later, even at the expiration of a month, and the complete closure of the wound has not always proved a safeguard.

The occurrence of tetanus in wounds, and of every degree of nervous disorder, from the most trivial local twitches, up to spasms of a whole limb, and general convulsions, were in former times attributed almost exclusively to the partial division of nerves. This doctrine, however, practitioners have been in some measure compelled to relinquish, from having had many opportunities of witnessing the partial lesion of nerves and tendons without any corresponding degree of subsultus tendinum or tetanus; and also from having repeatedly failed in relieving such symptoms, when they did occur, by the complete division of the nerves partially injured—a practice to which surgeons were naturally led by the foregoing hypothesis. It is certain also that the partial lesion of nerves has in many instances given rise to affections of a chronic and anomalous kind altogether different from tetanus; and of such singular and anomalous affections, numerous instances are recorded in the writings of Dr. Hennen, Mr. Guthrie, and other military surgeons.

The researches of pathologists have unfortunately thrown but little light upon the nature of tetanus, and one of them has expressed his apprehensions that "the extension of our investigations will be the abridgment of our hopes of cure." Of the few successful cases on record, perhaps not one-half have been treated on the principles deduced from any preconceived pathological views—the method of cure having been taken up on the purely empirical ground of experience and imitation. Tetanus is by all authors, I believe, allowed to be principally an affection of the nervous system, and some recent authorities, particularly the late Mr. Carmichael of Dublin, seem to be of opinion that the great sympathetic nerve is more immediately the seat of the disease, those

muscles being chiefly affected whose nerves communicate extensively with the sympathetic. Perhaps the opinion most generally entertained by modern pathologists refers this disease to an inflammatory affection of the spinal marrow, and in support of this opinion, Baron Larrey asserts, that in numerous dissections of soldiers, carried off by tetanus, particularly some of those who died from their wounds after the battle of Waterloo, he has constantly observed an inflammatory disposition of the spine. "Nous ont constamment présenté des traces bien évidents d'inflammation sur le moelle épinière, avec épanchement plus ou moins sensible de sérosité rougeâtre dans le rachis."

Amongst the most strenuous supporters of the opinion that tetanus has its seat in the spinal marrow, is Dr. Robert Reid of Dublin, the author of an essay on tetanus and hydrophobia, whose views upon this subject have led him, and fortunately also have led others, into a consideration of the comparative frequency of this disease amongst soldiers and amongst seamen. Dr. Reid first supposes that tetanus is more incident and more fatal to soldiers than to sailors, and then adopts the following theory to account for this:—"It is," he observes, "a remarkable circumstance that this dreadful malady is very seldom met with, even in its slightest stages, in the navy, while it is found generally fatal to military men; and it may be useful to take notice of a circumstance which gives a predisposition in soldiers to this disease, and to which sailors are not exposed. We observe that soldiers are unavoidably obliged to carry a certain portion of their luggage in their knapsacks on their backs;" and he adds, "that circumstances analogous to this would seem to account for horses being more liable to this disease than any other quadruped." Upon this, the reviewers ironically remark, that some measures should be taken to unload the spine and its vessels, by those official personages to whose province it peculiarly belongs to attend to those weighty concerns; and they suggest the propriety of transferring the burdens to the bellies of the men and horses, which would diminish the chances of tetanus, and obviate the calls to hunger by pressure on the stomach, after the fashion of the Indian warriors. Dr. Reid seems to have overlooked the fact, that military officers are not less liable to tetanus than

their men, although they carry no loads upon their backs; and he would have done well to have ascertained the truth of the supposed exemption of naval men from tetanus, before indulging himself in such speculations.

We are informed by Sir Gilbert Blane, that the number of wounded in the action of April 1782, in the West Indies, was 810, of whom 20, or about 1 in 40, were attacked with tetanus, 17 of whom died. In the army in the Peninsula from December 1811 to June 1814, 20,886 wounded soldiers were admitted into the regimental hospitals. Sir James M'Grigor has not been able to state to us precisely how many of these men were affected with tetanus; but we find from the returns subjoined to his paper, to which I have so often had occasion to refer, that no more than 506 of them died of their wounds. This last mentioned number applies, like the former, to men dying in the regimental hospitals, probably in the earlier stages of their wounds, and therefore within the period most liable to tetanus; but even making the preposterous supposition that every one of these individuals was carried off by tetanus, still it will not amount to the proportion observed in the navy, on the occasion above mentioned, being little more than 1 in 41. Making every allowance for the West India climate on the one hand, and for the deaths which may have been unnoticed or unreported on the other, still we have no reason to suppose that soldiers are more peculiarly liable to the disease than sailors, or that it is slighter or less fatal in the one service than the other. Even admitting that the year 1782 was peculiarly productive of tetanus, and the years 1812-13-14 peculiarly the reverse, we shall find that there are no grounds for Dr. Reid's assertion, "that tetanus is very seldom met with, even in its slightest stages, in the navy." Although it appears from a paper by Sir David Dickson, in the Medico-Chirurgical Transactions, that tetanus was much less common in the fleet in the West India islands of late years than formerly, yet we know, that after the action at Copenhagen in 1801, as large a proportion of tetanic cases occurred in the fleet as after any land battle whatever. The average number of tetanic cases amongst the wounded has, by a recent calculation of Mr. Alcock's,

been estimated at 1 in 79, and the proportion of recoveries is so small as scarcely to admit of calculation.

Our treatment of tetanus, it must be admitted, is in general as unsuccessful as our pathology is imperfect; but it is proper to state that, with a view of subduing this intractable malady, blood-letting, purgatives, cold and warm bathing, opium, mercury, camphor, musk, tobacco, digitalis, wine, ardent spirits, and other remedies have been recommended. Nothing, however, can more clearly prove the want of an effectual remedy for the disease, than the enumeration of a list of articles, many of them so opposite in their effects. Were I to specify any one of the above articles, of which I think more highly than another, it would be *Opium;* which may be exhibited in this disease, to an extent to which in other cases we would not think of pushing it. I have given it to the extent of two grains every hour, which is perhaps the smallest dose from which we can expect any benefit; and if from a relaxation of the spasms, while at the same time no appearance of coma or delirium occurs, we are encouraged to persevere in the exhibition of opium, the dose may be greatly increased, taking care to obviate costiveness by the exhibition of powerful purgatives and glysters, amongst which the turpentine and tobacco injections are particularly recommended. As proofs of the extent to which opium may be given with safety in cases of tetanus, I may refer to a case stated by Dr. Mackie of Southampton, in the twentieth volume of the "Medical Commentaries," where a patient of fifteen years of age, suffering from tetanus, in consequence of a wound in the fore-arm, took three and a half ounces of laudanum in the space of twenty-four hours; and in a case noticed in the nineteenth volume of the "London Medical Gazette," upwards of four pounds of laudanum, and upwards of six ounces of solid opium, were given in ten days; a fact which seems only to admit of explanation on the supposition that the medicine remained inactive in the stomach. One of the remedies which has lately been most confidently spoken of in the cure of tetanus, is an infusion of tobacco in the form of a bath. Several very interesting cases in support of this practice are detailed by Dr. Anderson of Trinidad, in the first and second volumes of the Transactions of the Medico-Chi-

rurgical Society of Edinburgh; and tobacco would seem also, from Mr. Curling's valuable Essay on Tetanus, to be one of the remedies, in favour of which there is the most satisfactory evidence. More recently, several recoveries from tetanic affections are stated by Dr. O'Shaughnessy and others to have taken place under the use of the Cannabis Indica, or Indian hemp, and this is a remedy which has been successfully administered by my colleague Professor Miller. The inhalation of chloroform is another practice of which, although I have no personal experience, I am inclined to think favourably, from having witnessed its very remarkable effects in a vast number of cases when administered as an anæsthetic agent; and upon the use of chloroform, which has been much agitated of late, I take this opportunity of saying that the worst, indeed I may say the only bad consequence which I have ever seen from it, was in the case of a delicate little girl, who had a rhinoplastic operation performed for a breach in her nose, and the sickness and retching which followed the exhibition of the chloroform continued for upwards of twenty-four hours, the sutures were torn open, and the cure in consequence rendered imperfect.

Of the local applications to lacerated or punctured wounds complicated with tetanus, warm anodyne fomentations, and large emollient cataplasms, are perhaps the best; but besides these, blisters in the immediate neighbourhood of the wound, or the blistering ointment applied to the wound itself, have been employed for the purpose of re-establishing the purulent secretion, which, in cases of tetanus, has been observed to be altered, interrupted, or suppressed. Baron Larrey has, in conformity with his views of the disease, recommended the use of caustics, actual and potential, both in the neighbourhood of the wound and along the course of the spine. When the foregoing measures fail to make a favourable impression on the disease, it is not surprising that the division of the principal nervous trunks supplying the wounded part, or the removal of the limb, should have been attempted. These are steps which, from the fullest consideration of the evidence both for and against the measure, we have no very great encouragement to undertake; at the same time, if practised in a very early stage of the disease, there is some reason to think that division

of the nerve, or amputation, might not unfrequently succeed in arresting its progress. In those cases where it has been adopted, amputation has naturally been resorted to with reluctance, as a desperate remedy, when the disease has been allowed to gain head by the lapse of time consumed in the fruitless exhibition of internal remedies; and when, indeed, the very exhibition of these remedies—the continued use of large opiates, of wine, and of porter—has perhaps brought the system into a state little likely to benefit by the operation. In short, my own experience of the effect of amputation in tetanus arising from lacerated or punctured wounds, is not sufficient to enable me to speak with confidence of its effects; nor, in scrutinizing the writings of practical surgeons, have I seen anything to convince me that this operation has yet had a sufficient trial in that very early stage of the disease in which alone I should expect it to be successful. The diminished number of tetanic cases which have occurred amongst the wounded since the practice of immediate amputation became generally established throughout the army and navy, is, I think, a strong argument in favour of a farther trial of this remedy in the early and acute form of the disease.

A partial success has induced Baron Larrey to advise this operation in the chronic form of tetanus; but in this state of the disease, I believe all the English surgeons, and particularly Sir Astley Cooper, have expressed their disapprobation of it. The uncertain efficacy of so severe a remedy, and the occasional possibility of curing this form of the disease by milder means, will for ever prove insuperable objections to this practice. The following statement of Staff-surgeon Boutflower, with reference to the state of the wounded under his care after the battle of Toulouse, gives too true a picture of the treatment and general result of cases of traumatic tetanus:—"Five cases of tetanus occurred—in one, the cold bath was the principal remedy; in a second, amputation was performed; in the third, the warm bath and pulv. ipecac. comp. were used; in the fourth case, opium and ether in excessive quantities were exhibited; and in the fifth, tinct. digitalis and bleeding were adopted; the result in all was fatal." Having only once had the good fortune to witness

the cure of a case of symptomatic tetanus, I cannot prolong my observations on this subject with any satisfaction to myself, nor, I apprehend, with any advantage to others; and have only to recommend that, in the present state of our knowledge of this disease, in which the mode of treatment must be entirely experimental, we should adopt that line of practice in which we may be disposed to confide, and pursue it without deviation, unmixed as far as possible with any other. By this means we are soonest likely to get rid of useless remedies, and to come to the knowledge of those upon which any reliance can be placed.

WOUNDS OF THE HEAD

From the vital importance of the brain, wounds of the substance of this organ, and even those affecting it indirectly through the medium of the scalp and the cranium, have always craved a large share of attention from those surgeons most distinguished in the civil department of the profession; and the statement of a distinguished military writer, that "one-half of those wounded in the head are left dead in the field, or perish before assistance can be procured," shows that the injuries of this kind inflicted by the sabre, shot, and shells, must ever be held of paramount importance to the army surgeon.

In simple incised and lacerated wounds of the scalp, when the cranium, the brain, or its membranes have not sustained any injury, the wound, however formidable it may appear from its length, does not bear a proportionate depth—it is wholly within our view, is easily accessible to every necessary examination, and readily admits of the removal of foreign bodies, or whatever other steps may be requisite before bringing its edges into apposition; hence such wounds are free from some of those difficulties which we experience in the treatment of wounds in other parts of the body. The saving of every portion of integument detached from the subjacent

bone, in consequence of incised or lacerated wounds of the scalp, was one of those improvements in surgery which was almost universally adopted so soon as it was proposed; and it is only surprising that an improvement so obvious—an improvement more and more recommended by every succeeding author—should have been left to be brought into notice by so recent a writer as Mr. Pott; for although some insulated cases in favour of this practice may be picked out from preceding writers, it was the good sense and authoritative character of Mr. Pott which led to the general practice of saving and replacing portions of the scalp detached by accidental wounds.

It is singular, however, that Mr. Pott, who saw so distinctly and inculcated so forcibly the propriety of laying down the scalp in such cases, and promoting its adhesion, should have failed to extend his principles to those cases in which the scalp is artificially and purposely raised to admit of a more perfect examination of the bone, or to make room for the application of the trepan. We are now so well aware of the use of the scalp in affording protection and nourishment to the subjacent parts, as well as in accelerating the cure, that we have no hesitation in extending to all wounds of this region, whether intentional or accidental, the maxim which Mr. Pott knew so well how to express but failed to extend—"Save and replace every detached portion of scalp which is not so obviously destroyed by contusion as to render its reunion a matter of impossibility." As it must frequently remain doubtful how far the vitality of a part is destroyed, the attempt to procure reunion will in almost every case be proper, and we learn from experience, that even when a sabre wound penetrates so deeply as to separate a portion of the cranium along with the integuments, the practice of replacing the detached parts is occasionally followed by reunion. Of this, instances are noticed in Dr. Thomson's report of the state of the wounded in Belgium, after the battle of Waterloo; and there are several wounds of the cranium figured in the first edition of Hennen's Military Surgery, in which reunion has obviously taken place after wounds of this description. I may also refer to a case of very old date, which is quoted from Berengarius by Mr. John Bell, and which he brings forward, in order to found

upon it a very unjust piece of criticism on Mr. Meinors, a surgeon at Birmingham, who was the first in this country to advocate the practice of laying down the scalp after the operation of trepan.

There are some circumstances worthy of notice which favour reunion of the scalp—as for instance, when a flap of the integuments of the cranium is raised from above downwards, or from the coronal towards the basilar aspect of the skull, so as to leave the principal nutrient vessels undivided, it lives and reunites more readily than when detached in an opposite direction; and it will readily be understood that reunion is more or less easily accomplished, in proportion as the base of a raised portion of the scalp is more or less extended. When a wound is very extensive or irregular in shape, it may sometimes be necessary to have recourse to stitches, for the purpose of retaining the divided parts in accurate apposition; but in a large proportion of sabre wounds, slips of adhesive plaster will be found sufficient, and this remark is also to be extended to many cases of lacerated wounds of the scalp. Although unable to confirm the fact from personal observation, yet it is proper to mention, as an encouragement to the practice of attempting reunion, in wounds detaching portions of the cranium along with the scalp, that such attempts are reported by the German surgeon Klein to have been more successful when both tables of the skull were implicated, than when the external table only was injured.

Wounds which lay bare any portion of the cranium, or in any degree involve its structure, whether inflicted by the sabre, or by a more obtuse instrument, are always to be considered of a hazardous description. But it would appear that the inhabitants of some foreign countries, particularly the natives of New South Wales, recover again and again from wounds of this description, which to a European would inevitably prove fatal. There is in the Museum the skull of a well-known character, chief of a considerable tribe to the northward of Sydney, in which the whole upper part of the skull, particularly the frontal and parietal bones, are disfigured by deep and extensive exfoliations, the result of blows received from the waddies, or heavy wooden bludgeons, with which the natives of that country fight. These various inequalities appear, at first

sight, to bear very much the character of having been produced by some specific disease, and some of my professional brethren are a little sceptical as to the origin assigned to them; but I am induced to believe it to be the true one, from observing that the inequalities are confined exclusively to those portions of the skull naturally exposed in their mode of fighting; that the lamellated and spongy bones of the nose, the alveolar processes, and other parts usually attacked by syphilitic disease, were in this instance sound; and also from the statement of Mr. Drummond, surgeon in the Royal Navy, by whose kindness I was favoured with a statement of this interesting case, and who assures me, that "the gentleman who gave him the head knew almost every occasion on which the injuries were received." Mr. Drummond's letter to me, published in the 57th volume of the Edinburgh Medical Journal, contains some very interesting observations as to the facility with which the natives of that country recover from injuries of the cranium, and the habitual indifference with which fractures of the bones, in general, are treated by them—in proof of which, he mentions that "both their sable majesties of the Sydney blacks are found to have artificial joints in the forearm."

Punctured wounds, from the bayonet or pike, are less frequent in the head than in the trunk of the body; and unless inflicted through the orbits, through the face, or towards the base of the skull, they do not, in general, penetrate deeply. Punctured wounds, however, on the upper globular part of the head, are frequently found to run obliquely between the integuments and bone—the point of the instrument having been turned aside by the latter. In such cases, a puffy erysipelatous swelling of the integuments, with great tension and tenderness of the scalp, are exceedingly liable to occur; and where this is threatened, much may be done to obviate it by judicious incisions or scarifications. By such incisions we procure a discharge of blood—we anticipate the effects of that tumefaction and tension which so generally occur in such wounds—we prevent perhaps the formation, and at any rate the lodgment, of matter over the bone.

The supervention of erysipelatous inflammation on wounds of the scalp, is an occurrence extremely common and liable to frustrate our views of reunion. This has been attributed to

the peculiarly dense texture of the scalp, or to the tendinous expansion of the occipito-frontalis muscle being implicated in the wound. The employment of stitches has been spoken of by some, and the use of adhesive straps by others, as if they alone were the cause of erysipelatous inflammation supervening upon wounds of the scalp; but the numerous instances which we see of erysipelas supervening on punctured wounds of the head, where neither stitches nor straps are employed, seem to me a sufficient refutation of this opinion. It is enough for our present purpose to notice the fact, and to state that the most effectual means of subduing it are the free discharge of blood from the wound, or from its immediate neighbourhood, by leeches or otherwise, the employment of mercurial and saline purgatives, antimonials in nauseating doses, cold lotions to the head, the most abstemious diet, and rigid abstinence from wine or spirituous liquors.

In gunshot wounds of the head, the injury is seldom confined to the scalp, but is found to implicate the bone or the brain itself, and often to give rise to the symptoms familiarly known to surgeons as those of Concussion, or of Compression, of the brain. It will therefore be well to advert briefly to these before proceeding to the consideration of fractures of the skull, and the lodgment of foreign bodies within the cranium.

Concussion is sometimes the result of a severe blow on the head, from a solid body impinging against it. In consequence, however, of the flexibility of the neck, the head yields in some degree to the impetus of a projectile, and hence concussion is less frequently the consequence of wounds from missiles than of falls from a height. In the latter case it is possible, and indeed it is not uncommon, that concussion of the brain may take place, although the head itself should not have come in contact with the ground, or with any solid body. The most prominent symptoms are an immediate abolition of sense and motion; the pulse weak, slow, and intermitting; the respiration languid, sometimes scarcely perceptible; the iris is insensible to the stimulus of light; and the extremities cold and relaxed. These symptoms are often transient, and in slight cases disappear without any surgical aid. There are some extreme cases in which the use of stimulants, wine, or brandy

and water, administered in small quantities, may be necessary to renovate the sinking powers. These, however, are to be used with a sparing hand, and to be withheld the moment that the immediate danger from collapse is over, and symptoms of reaction commence. In proportion as the immediate stupefaction consequent upon the injury subsides, the pulse rises, the respiration becomes more perceptible, sometimes laborious, the heat of the limbs returns, the pupils contract, the patient evinces an unusual degree of impatience of temper, is averse to answer questions, or answers them in a hurried manner; he becomes restless, is deprived of sleep, and complete delirium often supervenes, denoting an inflammatory state of the brain, or its membranes. This is what every concussion, not immediately fatal, is liable to terminate in; this is what should induce us to be very guarded in the use of stimulants in the first instance, from a fear of aggravating the subsequent inflammation; and this it is which calls for the abstraction of blood—the exhibition of purgatives—of antimonial sudorifics—the exclusion of light from the patient's chamber—perfect rest, and the most rigid abstinence.

The employment of blood-letting in concussion of the brain requires much discrimination. In cases where the concussion is so severe as to produce any organic lesion of the brain, or to lacerate any of its tender vessels, bleeding may in the first instance obviate internal hæmorrhage, and subsequently prevent the excess of inflammatory action. On the other hand, if too early employed, as is sometimes the case, it may convert a temporary into a fatal collapse, and if unduly persevered in, it may suspend the salutary action of the capillary vessels, upon which the repair of the injury depends. In young and vigorous subjects, it will readily be understood, that bleeding, in all points of view, is more admissible than in old soldiers subject to any chronic infirmity, or in habitual drunkards liable to delirium tremens.

The use of antimonials in cases of concussion has been much insisted on by some writers, and is now become a very common practice. Desault remarks that whether the medicine acted as an emetic, produced a copious perspiration, or operated by stool, its effects were found to be equally beneficial; and much of its salutary operation was

ascribed not merely to the evacuations procured, but to its producing a counter-irritation and excitement in parts distant from the head. Upon this principle of exciting counter-irritation, the application of blisters to the scalp is not unfrequently employed by surgeons in the inflammatory stage of concussion; but it has always appeared to me that the vessels on the outside of the skull which we wish to excite, and those on the inside of it, the action of which we wish to allay, are too nearly contiguous, and too intimately connected by anastomoses, particularly in young subjects, to enable us to produce upon them effects directly opposite. Are not the beneficial effects of cold lotions, and ice-bladders to the head, so commonly resorted to in cases of phrenitis, directly at variance with the principles upon which blisters are recommended? Do not the cold applications which I have mentioned operate by repressing the inordinate action of the vessels, both without and within the skull? And is it not upon this principle, the speedy evaporation and consequent cold, that the application of ether to the forehead and temples is found sometimes to relieve a headach? The injury to the brain, which is strictly termed concussion, when not fatal, is always of a temporary and transient nature; and it is the inflammatory disposition succeeding to it, or what, according to some writers, constitutes the second stage of concussion, which ought to be the chief object of anxiety and interest to the surgeon.

Compression of the brain again is of a more permanent character, and although proceeding from different sources, its nature and symptoms are essentially the same, differing however greatly in their severity and in the period of their accession. They may either supervene immediately after the accident, or come on at a more remote period, according as the pressure is induced by the immediate depression of the bone, the intrusion of a foreign body, or by the gradual effusion and accumulation of fluids within the skull; and this will again be more or less rapid as it proceeds from a ruptured vessel of greater or less calibre, or as it results from an accumulation of matter in consequence of suppuration.

The symptoms of compression are in a great measure the same as those which have already been enumerated as indicat-

ing the first stage of concussion, and they are nearly allied to those enumerated by medical writers, as characteristic of apoplexy. In severe cases every circumstance concurs to denote insensibility—the patient lies in a state of stupor, his limbs relaxed as if recently dead; he evinces no feeling of pain, nor is it possible to rouse him or induce him to answer questions; the pulse is slow and oppressed; the pupils of the eyes dilated, and the iris insensible to the stimulus even of a strong light; the breathing is laborious, slow, and stertorous; the fæces and urine often escape involuntarily, and the patient is sometimes paralytic in one or more members—the paralysis existing on the side opposite to that on which the injury has been sustained. From this it will be seen that no very marked criterion exists between the symptoms of concussion of the brain and those of compression, and the diagnosis is to be drawn, not so much from any intrinsic difference in these symptoms as from concomitant circumstances.

It may be remarked in general that *concussion* supervenes more immediately after the accident, and is more transitory in its nature, while *compression* in many cases supervenes later, and is more permanent. In military practice the causes of concussion are comparatively less frequent, while the causes of compression are often more obvious than in civil life; and it is so far fortunate for the army surgeon that a large proportion of those cases of injuries of the brain which come under his notice are accompanied with wounds of the integuments of the head, admitting an examination of the bone, and enabling him to ascertain immediately whether the symptoms depend upon depression.

Although what are called counter-fractures, or fractures occurring in a part of the cranium distant from that which received the blow, are capable of producing pressure on the brain in consequence of the laceration of vessels or the subsequent formation of matter, yet such counter-fractures are not attended with depression, and do not require immediate operation. In a very large proportion of such cases the mischief is situated towards the base of the cranium, totally beyond the reach of the trepan, and almost necessarily fatal. Indeed it has been stated by the late Mr. Earle, and in part confirmed by the experience of Sir Benjamin Brodie, that the

fracture in cases of contre-coup, generally passes through the occipital bone, and only happens where the blow seems to have operated in such a manner as to impel the occiput forcibly against the atlas. Cases, however, do occur in military practice, and much more frequently in civil life, where, without any severe or very conspicuous appearance of injury externally, symptoms of oppressed brain supervene, the patient never recovering from the first effects of the blow. Here concussion and extravasation are simultaneous, or at least the effects of the one supervene before those of the other have subsided; and when we have no distinct mark to indicate the precise seat of the injury, the case becomes extremely perplexing. If a patient recovers his senses and powers of motion after the infliction of a blow on the head, and within a few hours afterwards becomes again affected with stupor and drowsiness, these symptoms gradually increasing, accompanied with insensibility, and assuming altogether an apoplectic character, there is every reason to presume that the patient is suffering from extravasation of blood within the skull; and in every urgent case of this kind the surgeon is perhaps warranted in perforating the cranium, making the part stricken the centre of the perforation. This is a practice which some may hardly think justifiable, but in a case of this nature, where matters are hurrying on from bad to worse, it appears to me incumbent on the surgeon to have recourse to an operation which, from the insensibility of the patient, adds little to his sufferings, and by which we may have the gratification of rescuing him from otherwise inevitable death. These immediate extravasations of blood are naturally most liable to occur from injuries in the course of the meningeal artery, or contiguous to the sutures where the blood-vessels are most numerous; and the symptoms are produced by the effusion of blood making pressure on the brain or origin of the nerves, so as to impair or abolish sense and voluntary motion.

Another set of symptoms are caused by an inflamed or sloughy state of the membranes of the brain, and seldom affect the organs of sense until a late period of the disease, or until a considerable quantity of matter is formed, which makes pressure like any other fluid. These latter symptoms attending an inflamed state of the membranes of the brain

are all of a febrile character, and do not in the first instance denote unnatural pressure. The most usual and prominent are pain in the head, often described as a firm corded feeling round the forehead, restlessness, want of sleep, frequent and hard pulse, hot and parched skin, flushed countenance, inflamed eyes, intolerance of light, nausea, vomiting, rigors, delirium, and sometimes convulsions. Smart and severe blows on the middle part of the bones, at a distance from the sutures, are most frequently followed by this kind of mischief, which goes on to the formation of matter within the skull. The obvious indications in the early stages of such cases are, the employment of blood-letting and other antiphlogistic measures, with a view to repress the inflammation and obviate suppuration. When this suppuration is limited in quantity, and concentrated round the seat of the injury, relief is occasionally given by the use of the trepan, but it much more frequently happens that the matter formed by this secondary inflammation is diffused extensively over the surface of the brain or its membranes, and is not to be evacuated by a perforation. Others have no doubt been more fortunate, but it so happens that I have scarcely ever seen a drop of matter evacuated, or any relief given by the use of the trepan in such cases.

The three kinds of compression which I have now specified from depressed bone, from blood, and from matter, comprise all those commonly arising from the accidents which occur in civil life, and may all take place without any wound in the scalp; but in addition to this, we have to consider, with reference to military practice, the consequences of wounds penetrating the brain, and of foreign bodies lodging within the cranium. Wounds penetrating the brain or its membranes, although not necessarily fatal, must ever be looked upon as cases of the most hazardous description. The symptoms of such wounds, although various, anomalous, and sometimes inexplicable, are to be considered chiefly as of an inflammatory character, and have been already specified. With regard to the treatment, in addition to what has already been said, I would more particularly urge the necessity of being constantly alive to every occasional or periodical aggravation of the symptoms, and the propriety of meeting this by

repeated local depletion, by bleeding from the temples, or by the application of leeches contiguous to the wound. The utility of cold applications in idiopathic inflammations of the brain and its membranes, is established by long experience, and there is no remedy more appropriate to wounds of this kind, nor of the efficacy of which we have better evidence.

The eminent Prussian surgeon Schmucker, one of the most experienced surgeons who ever wrote on gunshot wounds of the head, places his chief dependence on *Cold Lotions*, occasionally combined with bleeding and stimulant clysters ; and the following interesting statement by the late Mr. Rose of the Coldstream Guards, in reference to this point, is highly satisfactory :—" In the battle of Talavera de la Reyna, which was fought on the 27th and 28th of July 1809, the brigade of guards lost about 600 men in killed and wounded. Amongst the latter were a considerable number of cases of wounds in the head. There were a great many cases of fracture of the bones of the cranium with and without depression, and from the cause which produced them, these were, of course, in every instance complicated with wounds of the scalp.

" On the 3d of August, in consequence of some military movements, the town of Talavera, in which the hospital had been formed, became exposed, and an order was given for all the wounded who could march to leave it. This was so speedily obeyed that no time was afforded to make any selection. The worst cases necessarily remained, but among those who undertook the march there were twelve or fourteen with wounds in the head, accompanied with injuries of the bone, at least four or five of whom had both tables of the skull fractured, and two of them, along with fracture of the os frontis, had each the globe of one eye totally destroyed. In none of them had the trephine been applied, nor had any attempt been made to remove splinters of bone. After leaving Talavera, they were exposed to a burning sun, and to very severe fatigue. Every evening, after the day's march, Mr. Rose collected the wounded round him, examined and washed their wounds, dressing with care those that particularly required it. Cold water was the principal application employed. The retreat occupied sixteen days, in spite

of which, and with no other treatment than that which has been described, every one of those who were wounded in the head recovered."

It is here distinctly stated by Mr. Rose, that a great proportion of his cases were, as generally happens in like circumstances, cases of what may be termed compound fractures of the skull. The distinction and difference in point of danger between a simple and a compound fracture, which is so well understood in the limbs or other parts of the system, is not less applicable to injuries of the head; and it is peculiarly important with reference to the practice to be followed in cases where portions of the bone are depressed or driven in upon the brain. In such cases, when the fracture is simple, the general rule is not to perform an operation for elevating the bone, unless the presence of urgent symptoms demands it. In cases of compound fracture, on the contrary, with any considerable depression, it is advisable to elevate the bone immediately, as a likely means of relieving the brain, and obviating not only present evil, but future bad consequences. This is the rule which appears to me most consonant to the dictates of common sense, it is the practical rule inculcated by Sir Astley Cooper's extended experience, and it is the conclusion come to by Sir Benjamin Brodie, contrary to his original prepossessions, and after comparing deliberately a great number of cases bearing upon this point. A peculiar species of fracture demanding the use of the trepan, is that consequent upon a bayonet or other punctured wound, sometimes also in a sabre or hatchet wound, where the internal table of the skull is driven inwards, as well explained by Mr. Guthrie in his valuable work on Injuries of the Head affecting the Brain.

We have now to advert to those cases where we find balls or other foreign bodies altogether within the skull, or lodged in its substance. In this last position, leaden balls have been found flattened, or partially split, sometimes one portion of the same ball without and another within the skull; or a ball has been completely split, one portion flying off, and another lodging. When such objects are easily accessible, it is our obvious duty to remove them immediately, even on the field; but whether, in the event of balls lodged

wholly within the cranium, it be in all cases advisable to institute a protracted search for them, requires some consideration. Every surgeon will, I am persuaded, be disposed to make the attempt; but before commencing an unguided search after balls, it becomes us seriously to weigh the additional injury which we may inflict. On the one hand, we have numerous cases recorded in the writings of Quesnay, of Larrey, of Hennen, and of other military surgeons, in which balls and other metallic bodies have been extracted from the cranium with success; on the other hand, there are numerous instances both of pointed bodies and of musket balls remaining imbedded in the brain, even for months or years; and in some such cases, the extraction of the foreign body has been immediately followed by alarming symptoms which did not previously exist, and even by fatal consequences.

In favour of immediate extraction, amongst other interesting cases, a very remarkable one is recorded by Baron Larrey, in which he traced a musket ball by means of a bougie, from its entrance at the frontal sinus to its lodgment under the lambdoidal suture, and by a corresponding measurement externally, he was enabled to apply the trepan over its site, to extract it with facility, and to relieve his patient from the symptoms of compression under which he laboured. This may be compared with another case referred to by the same writer, in which a portion of the blade of a javelin lodged in the brain for fourteen years, and was successfully extracted at the end of that period. This case may again be contrasted with one recorded in "Turnbull's Naval Surgeon," in which a portion of an iron spindle, three inches long, remained sunk for a period of eight years, in the orbit and brain of a child, and where febrile symptoms, ending fatally, supervened upon its extraction.

So various, indeed, are the results of cases in which foreign bodies have been lodged within the cranium, and so little has hitherto been done to afford a systematic view of this subject, that I consider the profession deeply indebted to Sir Benjamin Brodie for the interesting analysis which he has given of the cases of wounded brain, and of musket balls lodged within the cranium. I regret, however, to think, that I cannot altogether concur in the conclusions which Sir Benja-

min has drawn from these cases in favour of non-interference. "Ought we not," he says, "to regard it as the general rule, that the extraction of a ball should not be attempted—an exception to the rule being made only in those cases in which, from its more superficial situation, and other circumstances, the extraction can be easily accomplished without the employment of force, and without adding in any degree to the mischief already done?" Now I see so many sources of danger and so little chance of ultimate safety for a patient with a ball lodged in his brain, that nothing will induce me to countenance the practice of leaving it there except the impossibility of finding it. I do not, of course, mean to advocate a random search with the probe through an organ like the brain, in which, if it does not find an opening, it will readily make one. But whenever we have a distinct view of the course of a ball, and when its site can be ascertained with facility and precision, I am of opinion that it ought to be extracted even at the risk of some additional injury; in short, the prohibition of violence ought rather to apply to the search after balls than to the operation of extracting them.

In illustration of this view of the matter, I may refer to a case in which I was consulted a good many years ago—that of a little boy who, in the course of the rejoicings on the King's birth-day, got a small bullet, somewhat larger than a swan shot, lodged in his head. On seeing him several days after the accident, I found an orifice in the frontal line, to one side of the mesial line, and dropped, not pushed, a common silver probe into it, nearly its whole length, but without meeting anything like the resistance of a solid body. The gentleman in attendance asserted confidently that he had felt the ball immediately after the accident, close to the orifice. I expressed a hope that he was mistaken in this, as if so, I held it to have been his duty to have extracted it. This he did not see, and thought all was right when the little fellow recovered, so far as to be up, and playing with his toys. I still, however, adhered to the unfavourable prognosis which I had originally given; and after the lapse of five weeks, inflammatory symptoms supervened, terminating fatally; and upon dissection the shot was found lodged in the opposite side of the head, over the petrous portion of the temporal bone.

We see many instances of soldiers and others who have been wounded in the head remaining ever afterwards liable, upon the least excitement, to dangerous inflammatory and maniacal attacks, particularly in those cases where portions of bone are forced in upon the brain, or other mechanical injury done to it; and although it appears from Sir Benjamin Brodie's statement, that of ten cases of balls lodged in the brain, six recovered, or, perhaps, more strictly speaking, survived without extraction, yet this, as he justly observes, "affords no information as to the actual rate of mortality in cases of this description—the fatal cases being for the most part regarded as too much a matter of course to be worthy of publication, while a very different opinion is entertained respecting the cases of recovery."

In the removal of foreign bodies lodged within the cranium, the use of the trepan frequently becomes necessary, and I have long been in the habit of shewing in my class-room that in cases of a limited aperture in the cranium, such as that not unfrequently made by a musket or pistol ball, the trepan may be used without the centre pin, by working it through an aperture previously made with the instrument in a piece of hard firm pasteboard, or thin wood, and placing this over the shot hole. The circular saw is thus confined within the opening in the pasteboard, is made to revolve round the aperture in the cranium, to remove its ragged edges, and to save a considerable portion of sound bone, which must necessarily be included in the disc of the trepan when the centre pin is placed at the edge of the shot hole. Although I do not now enter into further details of the operation of trepanning, yet I may remark that the practice of military surgery has extended the use of this instrument, and shown its application to parts of the skull formerly considered dangerous or inaccessible. This must not, however, lead us to recur to that unmeaning perforation of the skull by the trepan, which, in former times, was practised with unrelenting perseverance, as if to show how much additional injury the cranium and its contents could sustain, and to prove that the means adopted to protect the brain from external injury are altogether superfluous. When we read the case narrated by Gooch, in which he perforated the cranium no less than thirteen times, and

when we read another case narrated by Godifredus, in which no fewer than twenty-seven perforations were made, we are almost tempted to believe that Philip, Count of Nassau, who survived this riddling of his skull, was more beholden to a good constitution than to the skill of his surgeon—that he recovered, in short, in spite of these multiplied perforations, and not in consequence of them. It appears, however, that Henry Chadborn, who performed this noted operation, was fully sensible of the honour it did him, and in order to secure his claim, obtained the following certificate from the patient: —"Ego infrascriptus attestor me ab Henrico Chadborn, Chirurgo Neomagnesi postquam *vigesies septies* mihi caput perforasset recte sanatum fuisse."

It will readily be understood that I allude to these cases not for imitation, but in illustration and in justification of the term by which I have characterised the practice—an unmeaning perforation of the skull. Many other cases might be adduced to show the little inconvenience which patients occasionally sustain from perforating the cranium. Amongst these is one mentioned by Schmucker, where the trepan was applied eleven times in less than a month, and so little was the patient inconvenienced by this operation, that he hardly ever went to bed after it, and upon one occasion actually went to market within an hour after its performance. While I cannot look upon the operation of trepan as adding much to the danger of those hazardous cases in which it ought to be employed, we must not be hurried into an undue partiality for its performance, but must always bear in mind the sentiments of the Danish surgeon Callisen, as expressed in his Systema Chirurgiæ Hodeirnæ, "*Gravis tamen satis est operatio, et nunquam, nisi indicationes sufficientes adsint, instituí debet.*" We must recollect that apertures made in the cranium, whether by the trepan or otherwise, occasionally give room for the appearance of those troublesome excrescences or protrusions termed *herniæ cerebri*, which, although somewhat lightly spoken of by a late distinguished surgeon, my own experience leads me to look upon as occurrences of a most formidable and dangerous description.

It should always be borne in mind that there is, generally speaking, but one affection—namely, compression of the

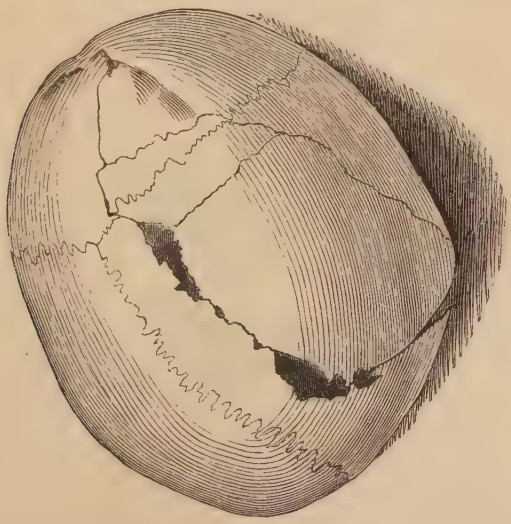
brain, which can be removed by the trepan, and it may be well to caution the young practitioner against the extremes into which surgeons have run in estimating the advantages of artificial interference in injuries of the head. "Look," says Mr. John Bell, "into the books of the ancients, and you would believe that every capillary fissure was attended with peculiar danger, and that without the most adventurous operations the patient could not live." "Name me," says he, "one absurd or cruel measure—the amputation of large pieces of scalp—the widening of fissures—the perforating the cranium with many trepans—and opening the dura mater for every idle suspicion or imaginary purpose; name me any extravagance for which their works do not afford us a precedent." "Turn again," says Mr. Bell, "to the works of more modern authors, and you would be persuaded that the more violent the fracture the less the danger; that your patient, though he lie in a deadly stupor with fractures of the skull, or deep wounds of the brain, needs but to lie undisturbed or unassisted to insure his perfect recovery."

Even in recent times, we find the most distinguished surgeons of the day inculcating practices diametrically opposite —Mr. Pott in England encouraging a use of the trepan almost unlimited, and Desault in France, in the latter years of his life, renouncing it *in toto*—his practice apparently becoming enfeebled as his experience increased. Nothing can possibly be more perplexing to students of surgery, than such difference of sentiment between authors whose practical habits and extensive experience render it difficult to say which of the two is most worthy of confidence. Nothing appears to me so injurious to the profession as sweeping and indiscriminate conclusions of this kind. When patients are represented as generally or uniformly doing well under opposite modes of treatment, the public will be apt to conclude that they would do equally well without either.

In the fifth volume of Larrey's "Clinique Chirurgicale," is a valuable paper on the consecutive effects of injuries of the head, and when in Paris in 1841, I was presented by the Baron with an additional memoir, "Sur l'occlusion des plaies de la tête," and was shown in his cabinet several pieces illustrative of that memoir. In general, apertures made in the

cranium, either by the trepan or otherwise, are imperfectly closed, leaving the brain underneath protected only by membranous substance, and consequently much exposed to accidental or intentional violence. A remarkable example of its exposure to such violence is given in Baron Larrey's paper, in the case of an officer of artillery who, for many years, survived a sabre wound with loss of substance of the right parietal bone, subject always to a confused noise when he removed the bandage or leather shield which he wore over the cicatrix. This officer being accused of some disgraceful peculation, ultimately committed suicide by plunging a knife through the aperture into the substance of the brain.

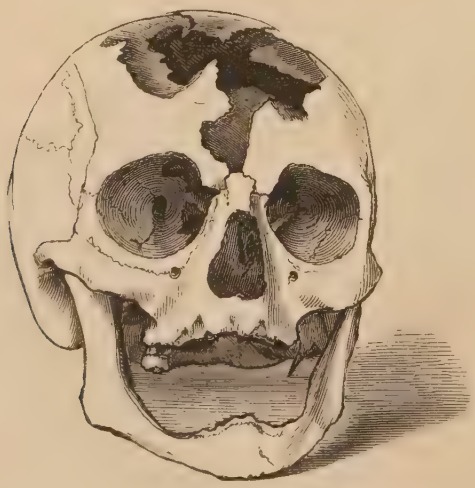
In some cases a deposition of bone takes place from the edges of the opening, so as partially or even wholly to close the aperture, and the extent to which this proceeds naturally depends much on the youth and vigour of the patient's system. We have in the following woodcut a sketch of the calvarium of a subject, who must have sustained one of the most severe injuries of the head which I have ever known a



patient to survive. Here we have a fracture with partial detachment, depression, and subsequent reunion of a triangular portion of the frontal bone; an extensive fracture, insu-

lating a large portion of the right parietal bone, with loss of substance, near the saggital suture and contiguous to the longitudinal sinus. Some of the fragments removed from this skull are deposited along with it in the museum, and although obviously incomplete, are sufficient to show that the aperture has at one time been larger. It is partly filled up by the reproduction of bone from either side of the breach, shelving towards the edges, and at one or two points stretching across the chasm. Of this patient's case, who was a workman in the Dockyard at Portsmouth, I have not been able to obtain the particulars, but it is obvious that he must have survived the injury for a length of time, and that he must have been a man in the early period of life.

In this cut again we have a representation of the skull of a field officer in the army, who was wounded in the forehead by a musket ball at Waterloo. He survived many years afterwards, subject to epileptic fits, and has evidently lived to become a very old man. In this case, although the caries or



ulcerative process is stopped at some points, and the edges of the bone rounded off, there is no attempt at reproduction, the breach now presenting an irregular area more than six inches in circumference in the outer table, and somewhat less in the

inner. In the former case it would seem as if the restorative had exceeded the destructive process—in the latter the reverse.

A particular sympathy has been supposed to exist between the head and liver, so as to render the latter organ peculiarly liable to become the seat of abscess in connection with injuries of the head. My own experience, however, inclines me to look upon accidental coincidences of this kind as examples or illustrations of a much more extended proposition—namely, the occurrence of secondary abscesses, or purulent deposits in the internal parts, after wounds and operations. This is a subject to which the attention of the profession in this country was first particularly directed by the late Mr. Rose of the Guards, and subsequently, amongst others, by my colleague and former apprentice Dr. Balfour, in a valuable probationary essay presented to the Royal College of Surgeons here in 1833. In support of my own opinion upon this subject, I may state that Valsalva, in all his examinations of patients dying after wounds of the head, found the liver only once, and the lungs four times affected. Klein again states it as his opinion that the liver is more apt to be the seat of secondary abscesses after lesion of other organs than of the head.

WOUNDS OF THE SPINE.

Wounds and injuries of the spine are in many respects allied to those of the cranium. They sometimes occasion transitory concussion, liable to end, like that of the brain, in inflammatory action. They also very frequently occasion paralysis of the inferior parts of the trunk and of the limbs, from compression of the spinal marrow; which may, as in the head, be caused either by depression or displacement of the bone, by the accumulation of fluids within the sheath of the spinal cord, or by the intrusion and lodgment of foreign bodies. In those cases of injury of the spine from cannon and musket shot, incident to soldiers and seamen, and in those accidents which happen more particularly to the latter, by falls from the rigging or through the hatchways, the seat of

the injury is for the most part conspicuous, and it will readily be understood that the symptoms vary considerably, as the injury is more or less distant from the occiput.

In every severe injury of the spine, besides the pain and inflammatory swelling, with their usual concomitant, fever, we have paralysis, more or less complete, of the parts which derive their nerves from the inferior portions of the spinal marrow. If the injury be above the origin of the nerves supplying the thoracic muscles, the respiration is impeded, or, if lower down, the respiration may go on freely; while the alvine and urinary evacuations are suspended or impeded. In all parts of the spine, diastases or subluxations are liable to occur, for the most part followed by inflammatory action, which, in the early and acute stages, often demands blood-letting, both general and local, with other antiphlogistic measures. But when the inflammation appears in a chronic or subacute form, it is best treated by repeated local bleeding, the actual cautery, caustic and blister issues.

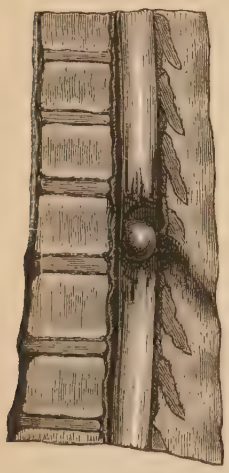
In the region of the neck, we have occasionally luxations of the vertebræ, ending for the most part fatally. A remarkable example of complete luxation was transmitted to me many years ago, by Mr. Oldknow of Nottingham, in which the displacement took place between the fifth and sixth cervical vertebræ. It was unattended "with any apparent mechanical injury to the spinal marrow, or its membranes, except what arose from pressure. The patient died about the fourth day from suffocation, produced by accumulation of mucus in the aërial passages, which he was unable to expectorate." In the dorsal and lumbar regions of the spine, dislocations of the vertebræ without fracture are exceedingly rare, although not perhaps, as some have supposed, impossible occurrences. Indeed, we have a remarkable case noticed in Baron Larrey's works, of a dislocation which occurred between the last dorsal and first lumbar vertebra, in which the patient's leg was at the same time fractured, but the paralysis was so complete that the fracture was not felt.

The lodgment of foreign bodies in the spine, and fractures of the vertebræ, with compression of the spinal marrow, have led to the operation of trepanning the spine, with a view to the relief of such cases—a practice which has, on the one hand,

been advocated by Sir Astley Cooper, and on the other, condemned by Sir Charles Bell in the most unqualified terms. It is quite possible to conceive a case of compound fracture, with depression of the posterior or dorsal arc of a vertebra, in which it would become the surgeon's duty to elevate the depressed bone, by the use of the trepan, or one of Hey's saws. And I am not prepared to say, that a case might not occur in a very thin or emaciated subject, in which, even although the fracture should be a simple one, the nature of the depression might be so obvious, as to justify the surgeon in cutting down upon it, and taking the necessary means for its elevation. Indeed we have an example of the successful result of such an operation noticed in the Essays of Dr. Monro, Secundus, in the case of a seaman treated by the late Dr. Blair, Professor of Practical Astronomy in this University, and formerly a surgeon in the Royal Navy. Certain it is, however, that in the common run of practice, either in civil or in military life, very few cases occur in which the operation of trepanning the spine ought to be performed.

Such accidents, if not speedily fatal, are for the most part so obscure, from the thickness of the superincumbent parts, and the adventitious swelling from the injury, that we are not warranted in cutting down upon the bone, and converting a simple fracture into a compound one, when, after all, the depression might be found to exist in the anterior or sternal arc of the vertebra; and when we might have the mortification to find the whole substance of the spinal cord between us and the depression, or rather displacement. Sir Charles Bell has well represented the possibility of such an occurrence; and a due consideration of it will make us hesitate to subject our patient to a positive evil, without a great probability of doing him good—the more so when we are aware that, notwithstanding the very hazardous nature of wounds of the spinal marrow, its complete division by the displacement of the vertebræ, or otherwise, has not always proved fatal. Of this a very remarkable example is given by the same distinguished surgeon, in the case of a young subject who survived a complete division of the spinal marrow for thirteen months, but died from other causes. Two cases of this description have fallen under my own observation. In one of these the spinal marrow was torn

across in consequence of fracture and dislocation in the lower part of the cervical region, the patient surviving three months, with general paralysis. The other case was that of a serjeant-major of dragoons, who was assassinated by one of the men of his troop in the cavalry barracks at Piershill. The pistol-ball in this case entered the lower part of the dorsal region, and was found lodged in the vertebral canal, having fairly cut across the spinal marrow. The patient survived nine days, with partial paralysis of the lower limbs, fever, and dyspnœa, but without any symptom indicating the precise nature or extent of the injury which he had received.



WOUNDS OF THE FACE AND NECK.

Every surgeon must have observed that the vascularity of parts in the region of the face causes them to reunite readily after incised wounds; and this should not only encourage him to attempt a cure by the first intention, but renders it incumbent upon him in almost every instance to do so. Wounds implicating the bones of the face, and those accidents which involve the loosening or complete detachment of the teeth, are often treated successfully by a careful and accurate replacement of the parts, and they sometimes heal rapidly without any deformity. The lesion of different nerves gives rise occasionally to singular paralytic affections or distortions, either temporary or permanent, but these we have no means of obviating.

Wounds of the eye, and those in the neighbourhood of the orbit, or base of the cranium, independently of other peculiarities, are always more or less dangerous, from their con-

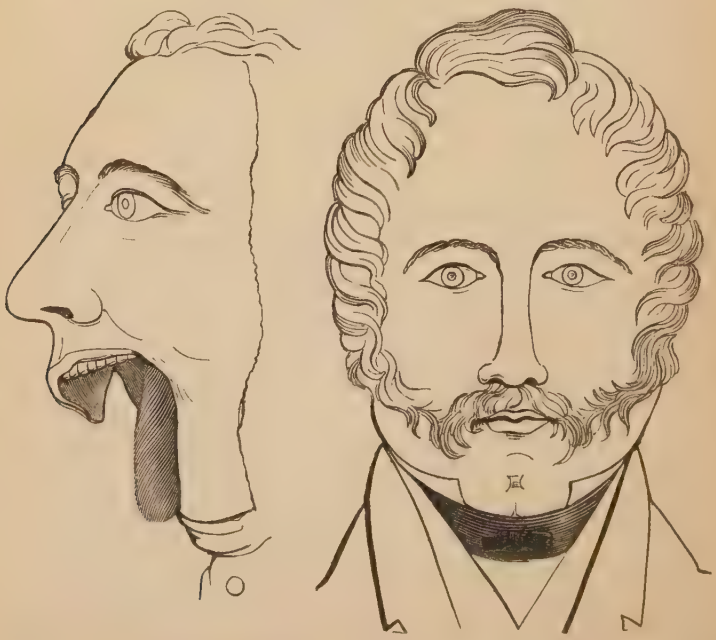
tiguity to the brain, and this circumstance must always be borne in mind in their treatment. Wounds of the cheek which cross the course of the parotid duct are often followed by salivary fistulæ, from the opening of this canal, and it will readily be understood that this is more likely to happen when the wound does not penetrate the mouth. In fact, one of the most effectual means of obviating this occurrence, is by carrying the incision completely through the cheek, and thus affording facility for the formation of an internal instead of an external fistula; or the saliva may be artificially conducted into the mouth by means of a seton. Desault proposed the cure of salivary fistulæ, by compressing the parotid gland of the affected side to such a degree as to destroy its function, and to stop the secretion of saliva from it. It seems to me, however, extremely questionable whether patients in general could bear the necessary pressure for this purpose, or whether it could be effectually applied.

The numerous operations which have of late years been undertaken for the removal of portions of the upper jaw, or of morbid growths in the antrum, afford very remarkable proofs of the liberties which may be taken with these parts, and give us encouragement to undertake the removal of foreign bodies when lodged in this cavity, of which we have, amongst others, interesting examples in Dupuytren's "Blessures par armes de guerre." One of the most remarkable cases of this kind is that of Lieutenant Fritz, of the Ceylon Regiment, who carried in his upper jaw, for upwards of seven years, the breech of his fowling piece, which, in consequence of bursting in his hand, had entered his forehead between the eyebrows, lodged in the region of the nares, and projected partly through the palate. A *fac simile* in bronze, giving the exact dimensions of this substance, more like the breech of a soldier's musket than a fowling-piece, is to be seen in the museum; and some illustrative drawings, which were given to me by Mr. Young, formerly of the 78th Regiment, have been published in the 57th volume of the Edinburgh Medical and Surgical Journal, along with the details of the case, of which I have been for sometime in possession, through the kindness of Deputy-Inspector-General Marshall.

I have never seen, nor do I ever expect to see such wounds inflicted by accident, as those which I have purposely inflicted

and seen others inflict, for the removal of polypous tumours, originating in the cavities of the upper jaw. Of these cases, more than twenty have now been operated on by myself or by others under my observation. And although the result has not always been satisfactory, as regards the complete eradication of the disease, yet the little constitutional disturbance which has often attended these severe and protracted operations, and the rapid and complete closure of the external wound, have surprised me more than most things which I have had occasion to witness in the practice of my profession.

The lower jaw has in many cases been partially, in some wholly removed, both by operation and by gunshot wounds. This woodcut represents a cast in my possession, taken from the face of Alphonse Louis, a gunner in the French artillery, who was wounded at the last siege of Antwerp, and whose case is detailed by Sir W. Whymper, in the 12th volume of the London Medical Gazette, with an account of the in-



genious contrivance made to supply the loss of parts. Of this contrivance I have been enabled, through the kindness of

my friend Mr. Nasmyth, to exhibit a model or *fac-simile* to the students of military surgery here for some years past. An abstract of this case will be found in the 57th volume of the Edinburgh Medical and Surgical Journal, and the woodcut will give some idea of what may be done to restore the appearance of an individual so grievously mutilated. The mechanism of this contrivance, which added so much to the comfort of the "Gunner with the Silver Mask," I find it impossible to explain by a figure, and would only observe, that it affords a support to the pendulous tongue, prevents the saliva from dribbling over and excoriating the fore part of the throat, enables the patient to speak with facility, and to be fed with ease.

The numerous parts of importance which lie on the fore or sternal aspect of the neck, the large blood-vessels and nerves, the respiratory and alimentary tubes, which occupy this region, render its wounds extremely hazardous. In adverting to the relative situation of the trachea and of the carotid arteries, which are here so much exposed to injury, we may remark that the large blood-vessels gradually recede backwards as they advance upwards, or rather that the prominence of the larynx, or *pomum adami*, exposes it more immediately to wounds in the upper part of the neck, and in some degree protects the arteries from injury. Hence the frequent escape of these vessels in attempts at suicide, in consequence of the incisions being made too high.

Wounds of the larynx and trachea, although difficult to heal, and liable to give rise to inflammation which may extend downwards into the bronchiæ, are not in the first instance peculiarly dangerous. In simple incised wounds of this kind, attempts to heal them by the first intention are sometimes successful, and should always be made; but it often happens, that after having brought the edges of the wound into accurate approximation by plasters or stitches, we are again, in consequence of irritation, or of emphysema in the neighbourhood of the wound, compelled to throw it open, to allow the patient to breathe through the aperture, and to permit it to heal by granulation. We have examples of both the trachea and œsophagus having been opened at once by the same wound, and in some rare cases, one of which I had an

opportunity of seeing, both these tubes were completely divided by an incised wound. The wound in each of the canals became fistulous, the patient breathed through a silver tube which he wore in the trachea, and which, at the time of his meals, was withdrawn to make room for the introduction of an elastic gum tube into the œsophagus, for the purpose of conveying into his stomach strong soup or beef-tea, on which he was fed for years. When apertures in the trachea have remained long in a fistulous state, the portion of the tube above the wound contracts greatly in diameter, so as to prevent the possibility of closing the wound until the canal is again restored by dilatation to its proper dimensions. With this view a series of bougies or plugs progressively increasing in diameter, were, in some cases which I saw, successfully employed here by Mr. Liston, evincing in a very remarkable manner the liberty which we can take with these parts in the way of operation; and demonstrating a fact which has often been observed, that in examining and dressing wounds about the fauces or throat, the tickling sensation produced by treating the parts with extreme delicacy, is less easily borne than more rough handling.

Wounds of the primitive carotids are so generally fatal that it were idle to enlarge upon them. We have indeed some instances of escape, and amongst others a case is recorded by Baron Larrey, of an officer wounded at the siege of Acre by a musket shot, said to have opened the common carotid, and in which the patient was saved by one of the artillerymen plugging up the orifice with his fingers until the Baron came to his assistance; but the case is given with so imperfect a detail as to render it but little instructive. In the event of balls or small shot lodging in the region of the neck, we are much hampered in our efforts to remove them by the contiguity of the large vessels and nerves, but, in some cases of this kind, one of which is related by Baron Percy, nature has found a channel for the exit of the ball by its perforating the œsophagus, passing into the stomach, and being ultimately discharged by stool. Wounds on the back or lateral part of the neck require no peculiarity of treatment; they are not dangerous, nor attended with any peculiar symptoms, unless they penetrate so deeply as to involve the spinal marrow and

its membranes, or to wound the great nerves going down to the axillary plexus.

WOUNDS OF THE THORAX.

The expanded surface of the thorax renders wounds of this region frequent in battle, while the vital importance of the organs lodged within it render them also peculiarly dangerous. It has already been observed that the head and upper part of the trunk are particularly exposed to sabre wounds in rencontres amongst the cavalry; while the common error, particularly of young soldiers, in levelling too high, may be considered as a circumstance more particularly exposing the thoracic cavity to wounds from fire-arms.

Superficial wounds of this region offer nothing very peculiar in their character, nor do they require any particular mode of treatment, if we except the great caution requisite to prevent the inflammation from extending to the pleura, the lungs, or the heart. From the contiguity of these important parts, wounds of the thorax, even although not of a very alarming appearance, have occasionally, particularly in those predisposed to pulmonary complaints, terminated fatally, and these fatal terminations are liable to become more frequent in consequence of the wounded soldier lying exposed, as he often must do, to the inclemencies of the weather. As an encouraging example, however, to show the very desperate wounds of the thoracic region from which patients occasionally recover, even under the disadvantages of season and external circumstances, I may refer to that of a private of the Royal Artillery, who was wounded by a twenty-four pound shot, while employed in the batteries before Antwerp in February 1814. In this case the great pectoral muscle was completely separated from the ribs, the left clavicle, first rib, head of the humerus, and scapula shattered. "I removed," says Sir Andrew Halliday, by whom the case is recorded in the eleventh volume of the Edinburgh Medical Journal, "the broken fragments of the clavicle, the

whole of the first rib, and the greater part of the head of the humerus. It was my intention to have cut down upon the bone, and to have removed the whole of the fractured part of the humerus, but as this seemed hopeless, and the patient appeared sinking, I contented myself with removing the loose pieces of the scapula that were found in the wound; and after removing the extravasated blood *from the surface of the lungs and pericardium*, the fleshy parts were brought together and kept in their position by means of stitches. The patient was carried from the operation-room to a low ward, where, being covered over with a blanket and a quantity of hay, he began in a short time to revive considerably. When I visited the General Hospital at Williamstadt in the end of March, I found him in a forward state of convalescence. In August last, I saw this patient at Antwerp, perfectly recovered, and believe he has now gone to England as an invalid."

Wounds which penetrate the thorax without more or less affecting the contained organs, are comparatively rare, for it is difficult to conceive the impulse of a wounding body, whether it be the edge of a sabre, the point of a lance, a musket bullet, or a splinter of shell, so nicely regulated as to pass through the ribs or intercostal muscles, and not to wound the lungs within. It has indeed occasionally happened that obtuse bodies passing apparently through the chest, have, upon more accurate examination, been found not to have opened the sac of the pleura, but to have detached this membrane from the parietes. Of this a very interesting example occurred some years ago in the neighbourhood of London, in which a gig shaft entered the patient's left side, traversed the posterior surface of the sternum, and passed out on the opposite side, detaching the pleura from the interior of the ribs, but without perforating this membrane or wounding the lung. Another case was mentioned to me by the late Mr. Clift, of the College of Surgeons in London, in which a large-sized shot, to the best of his recollection, a four-pounder, took a similar direction through the chest of an officer, who, after much suffering, ultimately recovered.

To discover whether a wound of this kind had injured the lungs or not was a point which in former times gave occasion for the exercise of great ingenuity, and led, as Dr. Hennen

observes, to the "waste of time and wax-tapers in ascertaining the exit of air through the passage." But no practical surgeon of the present day will, I presume, be disposed to trust to such a criterion, nor to spend his time in ascertaining the existence of an occurrence which art can so little obviate. When air issues from a wound in expiration, there is ground for suspecting that the lungs are wounded. But this is not to be considered as an infallible proof of such an injury; for when there is simply an opening in the chest, without any injury of the lungs whatever, the same symptom may occur, the air which is discharged through the wound during expiration may have previously entered through the same wound in inspiration. Symptoms less equivocal are—bloody expectoration—severe, urgent, and increasing dyspnœa—insupportable anxiety and faintness immediately succeeding the accident. These are the most prominent symptoms of a wounded lung; they are indicative of internal bleeding, which is the great primary danger in such cases.

Considering the very vascular texture of the lungs, and the large quantity of blood passing through them, the profuse internal hæmorrhage, the extreme faintness and rapid sinking of the patient, are very readily explained. But there are other circumstances connected with these wounds less easily understood, and there are perhaps few subjects in surgery on which more erroneous opinions have been entertained, and more false views promulgated than on the subject of wounded lungs. Some writers would lead us to believe that in all wounds penetrating the thorax the whole lung of the wounded side must immediately and inevitably collapse. Others again have stated, as an antithesis to this, that in many such cases a portion of the lung protrudes from the wound, forming a species of hernia. Both these occurrences do occasionally take place, but of the particular circumstances which lead to the one or to the other, I confess that I am unable to speak with precision; and nothing can be more erroneous than to represent either of them as an uniform or necessary consequence of such wounds.

Other writers, affecting a degree of precision which nature does not always choose to follow, have asserted that when openings are made into both sides of the thorax, exceeding in

diameter the area of the glottis, and thus admitting of the entrance of more air by the wounds than by the trachea, that both lungs must instantly collapse, that breathing must cease, and the patient die. This view of the matter, which has been advanced with confidence, and thought to afford a ready solution of the different results of wounds penetrating the thorax, will not be easily admitted by those who are acquainted with the singular recoveries which the records of surgery contain, from cases of punctures with the small sword or bayonet, to those where the cavities of the chest have been opened by musket balls passing through the thorax. That wounds even of this desperate kind are not, as has been supposed, instantly fatal, we have recent and interesting proofs in Meniere's "L'Hôtel Dieu de Paris en Juillet et Août 1830."

I have already observed that the more immediate danger of penetrating wounds of the thorax is from internal hæmorrhage, marked by an extreme sense of oppression and faintness, increasing difficulty of breathing, a tickling cough, and very frequently bloody expectoration; which last symptom has been generally enumerated as one of those most characteristic of wounds of the lungs. Wherever these organs are penetrated deeply, hæmoptysis must occur from the blood finding its way into the larger branches of the bronchiæ; but in superficial wounds of the lungs, blood may be effused to a considerable extent without any being expectorated, of which I have seen two remarkable instances. Besides the branches of the pulmonary artery within the lungs, other sources of hæmorrhage in wounds of the thorax are the intercostal and internal mammary arteries. Hæmorrhage from the last-mentioned vessel is exceedingly difficult to detect or to control, and I have seen more than one instance of fatal bleeding from this source.

In wounds of the intercostals, accompanied with fractures of the ribs, the source of the hæmorrhage is often obvious, and various expedients have been suggested for its suppression. The passage of a curved needle, armed with a ligature, completely round the rib, compressing the wounded artery by means of a pledget placed over its orifice, and included in the ligature, was an expedient practised by Plench, and by

Theden, the Prussian surgeon-general. The employment of agaric or sponge, with continued compression by the hands of successive assistants, or the compressive purse of Desault, are the plans which have been most generally employed in suppressing hæmorrhage from the intercostals; but wherever it is possible to secure the bleeding vessel with a ligature by means of the tenaculum or dissecting forceps, it should at once be employed. The tying of a wounded intercostal must necessarily be considered as an operation of difficulty; but the determinate position of the vessel, running along the inferior margin of the rib, offers some facility in its execution; and when the wound is originally large, or when it has been enlarged for the express purpose, and where the patient is not very corpulent, it may be attempted with considerable chance of success.

The accumulation of blood within the thorax from one or other of the sources which I have mentioned, is an imminent source of danger in wounds of the chest. When the hæmorrhage arises from the lungs themselves, we have no efficient means of commanding it, and can only obviate it by general depletion, and thus diminishing the quantity of blood passing through the lungs; by substituting, in short, an open hæmorrhage from one of the brachial veins, for a concealed one within the thorax. This being the only artificial means to which we can trust, it must be boldly pushed to the utmost limit. Of the extent to which this depletion may be carried with safety and with success, we have some very remarkable cases on record, besides those mentioned by Le Dran and Schmucker; in the first of which the patient was bled fifteen times, and in the other he was bled four times a day for eight days successively. In the report on the military hospitals in Belgium by my predecessor Dr. Thomson, a case is mentioned in which 250 ounces of blood were drawn off by the lancet in eighteen days, exclusive of the quantity abstracted by leeches. In this case repeated hæmorrhages of arterial blood took place by the mouth, which were checked by repeated venesection.

In such cases we should bear in mind the following remarks of Mr. John Bell, who inculcates in his usual energetic manner the practice which every sensible writer on this subject has taught, which every experienced practitioner has

adopted, and to which alone we can attribute the favourable issue of many formidable cases :—"One thing is very clear, that if you bleed only when the cough and bleeding from the lungs return, you never can do wrong ; for this is the plain matter—The patient lying struggling before you is to lose a given quantity of blood ; if it be allowed to flow out into the lungs, he may be suffocated ; if you draw it from the arm, this suffocation is prevented ; if you keep him low enough by bleeding, there will be no blood to spare for this extravasation into the lungs ; if you bleed only when the bloody extravasation returns you are taking no blood away but that which you cannot save ; and thus you see, that it is only the most profuse bleeding that can keep your patient from suffocation ; and that will be established in your mind as a rule of sound practice, which seemed shocking and dangerous when mentioned in explaining only the general nature of wounds ; you will feel, by such cases, that the French surgeons (with all their partiality for bleeding), could hardly in such a case go too far."

On the subject of *emphysema* as a consequence of wounds of the thorax, notwithstanding all that has been written, much obscurity still exists—an obscurity which is in no degree diminished by the indiscriminate application of this term to two very different affections. Practical writers, however, have abundantly proved that the virulent controversies and plausible speculations formerly existing on the subject of emphysema, as well as the ingenious devices of air-pumps, syringes, and cupping-glasses, recommended for extracting the air, may be disregarded by those engaged in the actual treatment of wounds in the thorax. Speculative men have written upon this subject, as if emphysema was an inevitable consequence of wounds penetrating the thorax, while the following declaration is dictated by experience :—"When I first entered," says Dr. Hennen, "on the practice of military surgery, the fear of emphysema actually haunted my hours of repose. This fear I have often since witnessed in young men fresh from their studies, and in their search after and treatment of this accident, they have been embarrassed beyond measure. The plain fact is, that it does not occur perhaps in one case of fifty, and that in a great proportion of the cases where it does

occur, under judicious management it is trifling." This statement will perhaps diminish, in some degree, the apprehensions which many have been accustomed to entertain from the occurrence of emphysema; at least this I know, that my own apprehensions from this cause were much akin to those entertained by Dr. Hennen on his first entering the service, and my own experience in the treatment of wounds of the lungs has led me to the same conclusions which he has drawn.

It may, however, be very naturally and very justly observed, that if emphysema occurs but in one case of fifty, we must in such case be prepared to meet it. When, in consequence of wounds in the lungs, the air escaping from these organs does not find a ready exit by the external wound, it either accumulates within the sac of the pleura, compresses the corresponding lung, impedes the respiration, and constitutes the disease properly termed *pneumothorax;* or, finding its way into the cellular membrane, it becomes gradually diffused in the neighbourhood of the wound, constituting what is more strictly termed *emphysema.* This sometimes extends over the whole body, being naturally most liable to accumulate in those parts where the cellular membrane is most lax, permeable, and destitute of fat. Hence we find the eyelids, the throat, and scrotum distended to an enormous size, while other parts of the body, particularly the palms of the hands, and soles of the feet, where the air is unable to overcome the more firm connexion between the skin and subjacent parts, scarcely at all affected; and this partial exemption from swelling, instead of tending to preserve any degree of symmetry in the general appearance, only renders the deformity of face and of figure so much the more remarkable.

In extreme cases of general emphysema, the natural contour is altogether lost, and the patient resembles anything but a human being. By the great distension of the skin, the body is rendered almost quite rigid and immovable, and the pressure of the accumulated air on the organs of respiration brings on a sense of suffocation almost insupportable. Of the severity of this suffering, some estimate may be formed from the cases mentioned by Sauvage and by Littre. In one of these, an unfortunate soldier had his body wantonly blown up by some butchers, to such a pitch that he could scarcely move his limbs

from the extreme tension of the skin, and his breathing was so much oppressed and impeded, that he was obliged to seek relief by making deep incisions with a penknife about the region of the throat. Littre's case gives a still more accurate idea of the extent to which this distension in emphysema may be carried. Here the swelling was six inches deep about the neck, eleven inches over the thorax, nine about the abdomen, and four over all the other parts of the body, the scalp, the palms of the hands, and the soles of the feet excepted. In Larrey's "Clinique Chirurgicale," a plate is given which will perhaps convey a better idea of the appearance of a patient affected with emphysema than any verbal description.

Both the affections now described under the terms pneumothorax and emphysema, may be coexistent, but it is not so much the extent of the outward swelling as the accumulation of air within the thorax, compressing first the wounded lung, and subsequently pressing on the mediastinum, the diaphragm, and the opposite lung, which renders these cases so urgent and alarming. In cases where the air contained within the pleura has not escaped from a wound in the lungs, but has entered by the external orifice, we have it in our power to cut off any further supply, by closing the wound—a practice which should generally be followed in all wounds of this region. The air will then, by the expansion of the lung, have a tendency to escape from the cavity of the pleura, and to diffuse itself in the cellular membrane contiguous to the wound—a circumstance attended with no danger, and contributing greatly to relieve the oppressed breathing, inasmuch as the air, instead of being impacted within the parietes of the thorax, and pressing wholly upon the lungs, becomes diffused over an extensive surface exterior to the chest; and from this situation it may always be evacuated, if necessary, by scarification or punctures through the skin.

In some cases, it is difficult to determine whether the lungs, from being superficially wounded, do not furnish a part of the air, and hence the propriety of closing the external orifice has been questioned. This point may, however, in general, be speedily determined; for if, upon the external wound being closed, emphysema extends into the cellular membrane, while at the same time the difficulty of breathing continues progres-

sively to increase, it is then almost certain that the air is escaping from a wounded lung; and the rational practice is to remove the dressing, and permit the ingress and egress of the air through the wound, until time has been afforded for the wounded air-cells to be closed by the effusion of coagulating lymph, and the supervention of the adhesive inflammation—an event which will, under favourable circumstances, generally be effected in forty-eight hours. Whenever the closure of the breach in the lung is fairly accomplished, the case then becomes similar to the one already described, where the air is wholly admitted by the external wound. If from the oblique or indirect course of a wound through the parietes of the chest, air does not readily escape, but continues to accumulate within the pleura, so as to endanger suffocation, the opening must either be rendered more direct, or a new one formed. The practice recommended by theoretical writers, of employing exhausting syringes for the removal of air extravasated within the thorax, is now considered superfluous by all practical men, and the possibility of immediately and suddenly expanding a collapsed lung by such contrivances is disbelieved by the ablest surgeons.

In cases of fractured ribs, instances both of emphysema and of pneumothorax occasionally arise from the lung being wounded by spiculæ of bone, and in such cases, a bandage is applied round the thorax, with a view of restraining as much as possible the action of the ribs, so as to prevent the extension, and to promote the closure of the breach in the lung. Of late, we have had several interesting examples of pneumothorax, arising from openings in the lung formed by ulceration, and of the immediate relief given in such cases by making an opening in the pleura for the escape of the air. A remarkable case which occurred in the military hospital at Chatham in May 1823, is recorded by Dr. Davy, in the Philosophical Transactions; and another which I accidentally had an opportunity of witnessing, and which was operated on by Mr. Guthrie, will be found detailed in the London Medical Gazette, and in Johnson's Medico-Chirurgical Review for 1829. That case was peculiarly interesting, from its occurring in the person of a medical man, fully aware of the nature of his case,

alive to its dangers, and urgently seeking relief from an operation.

I have hitherto, in treating of this subject, considered it exclusively in reference to a perfectly sound state of the thoracic viscera, where no adhesions have previously existed between the pleura pulmonalis and pleura costalis; but it is well known that such adhesions are an every-day occurrence, and when a wound penetrates the thorax, over the site of an adhesion, the patient is fortunately exempted from the consequences of an accumulation of air within the sac of the pleura. The diffusion of air under the skin, in the form of emphysema, is not in this case less likely to take place, but I have never considered the superficial swelling under the skin as a matter of very serious moment, and its extension may generally be obviated by judicious punctures or incisions.

In some instances extensive incised wounds of the thorax, instead of being troublesome from the ingress and accumulation of air, have been attended with a herniary protrusion of the lung through the opening. Protrusions of this kind have in some instances been treated successfully by excision, a ligature having been previously placed round the base of the tumour. It is desirable, however, in all cases where the protrusion is recent and the lung sound, to return the protruded part into the cavity of the thorax. When this has not been accomplished in the first instance, and when, in consequence of the neck of the tumour being strangulated in the wound, mortification has already taken place, there is no urgent necessity for any operation; the mortified part will in due time be thrown off.

Most of the preceding observations have reference more particularly to incised or punctured wounds of the chest, and we have now to consider the consequences of gunshot wounds and of foreign bodies lodging in the cavity of the thorax. The irritation necessarily kept up by the lodgment of an extraneous body within this cavity, leads for the most part to purulent formations and hectic fever. But even after these have been far advanced, patients have been saved by extracting the foreign body. One of the most remarkable examples of this is a case recorded by Baron Larrey, in which a soldier received a ball between the eighth and ninth ribs of the right

side, and after lingering in several hospitals for a period of four years, the ball, a Russian one, was with much difficulty extracted, after cutting away a great part of the rib next below the wound; this rib was indeed so much weakened as to be broken by an effort at stool, and the intercostal artery wounded, notwithstanding which the patient ultimately recovered. Another interesting example of the successful extraction of a foreign body, the blade of a file, which had become buried in the chest, is recorded by Dr. Mayer of Petersburg, and to which I particularly refer, in consequence of its having given occasion to one of the best works we possess on wounds of the chest, a dissertation by this author, "*De vulneribus pectoris penetrantibus.*"

In some cases balls or other foreign bodies have become imbedded in the substance of the lung, and enveloped in an adventitious cyst or capsule, as happens in other parts of the body. A remarkable case of this kind is noticed by Mr. Arnot, surgeon of the Grampus, Hospital Ship, in which a seaman had a portion of an iron hoop lodged in his left lung for fourteen years. Three cases of the lodgment of balls are mentioned by Percy, and one by Boyer, in which a ball was found in the lung, which was known to have been received twenty years before. The more common consequence, however, particularly of balls lying loose in the cavity of the thorax, of which examples are also given in Percy's Manual, is the copious secretion of purulent matter, or *empyema*, a disease occurring also from inflammatory attacks in the chest without any mechanical violence. When the aperture made by a ball remains fistulous, it for the most part affords a sufficient opening for the escape of any purulent matter which may be formed, although it may not afford sufficient space for the extraction of the ball. For in cases of this kind, when the function of one lung has been long suspended, the intercostal spaces become diminished, the ribs become anchylosed, and the cavity on the affected side of the chest adapts itself to the diminished bulk of the collapsed lung. This change has been well explained by Baron Larrey, who has published, in his Clinique Chirurgicale, some figures illustrative of the altered shape of the thorax in patients who have laboured under empyema. It is the diminution of the intercostal spaces

in such cases which renders the removal of a portion of one of the ribs necessary, as practised by the Baron in the case formerly referred to; and I have been for years in the habit of showing upon the dead body that such an operation may be easily performed by applying the head of a trepan to the portion of rib we wish to remove.

When it becomes necessary to make an opening for the relief of idiopathic cases of empyema, the point of election, as specified in the systematic works on surgery, is between the fifth and sixth ribs, and midway between the spine and sternum. An opening in this situation will for the most part give sufficient facility for the escape of any fluid collected within the thorax; but in cases where a patient is greatly debilitated, and unable to make any effort for the expulsion of the fluid, I know from experience that it may be necessary to withdraw it by means of an exhausting syringe. I allude here to the case of a most promising young gentleman, a student of medicine, upon whom I performed this operation several years ago. This case is detailed by my late colleague, Dr. Duncan, in the 28th volume of the Edinburgh Medical Journal; and I am induced to refer to it, because I have discountenanced the employment of any apparatus of this kind when speaking of collections of blood or air within the thorax.

Wounds of the Heart have, in general, been too speedily fatal, and have too seldom become the subjects of surgical attention, to enable me to enter into any extended detail of their symptoms or their treatment. We have now, however, many proofs upon record, that bayonet and other punctured wounds of the heart are not immediately fatal. The different results occurring in wounds of the heart are to me, I confess, very difficult of explanation. Villeneuve, the French admiral opposed to Nelson at Trafalgar, is said to have committed suicide, and to have died instantaneously from puncturing his heart with a pin. And I have recently been furnished by Dr. Grace, of Cupar in Fife, with some of the particulars of a case occurring in his neighbourhood, where a man died in two days in consequence of a wound inflicted on the right auricle of the heart by a large worsted needle. On the other hand, we have in the 14th volume of

the Medical Gazette, a most extraordinary case of a boy surviving upwards of five weeks after the intrusion and lodgment of a wooden pin, three inches long, in the right ventricle of the heart. We have in the "Repertoire d'Anatomie et de Clinique Chirurgicale," an instance of a patient surviving for three weeks with a watchmaker's file lodged in his heart, traversing the left ventricle, passing through the septum, and projecting into the right ventricle. There are also examples of patients surviving for a considerable time musket wounds of the heart, of which an interesting case is recorded in the 14th volume of the Edinburgh Medical Journal, where a plate is given exhibiting the appearances of such a wound in the case of a soldier of the Queen's regiment, who was wounded at Corunna, and who died after his arrival in England, fourteen days subsequent to the receipt of the injury. In the article *Cas rares*, in the Dictionnaire des Sciences Medicales, we have an instance related by Fournier, and authenticated by M. Mausion, chief surgeon to the hospital at Orleans, of a patient who not only survived a wound of the heart, but may be said to have made a perfect recovery from it, inasmuch as he died at the distance of six years after the receipt of the injury, from disease unconnected with it, and the ball was found imbedded in his heart. Further information on this subject may be found in a Thesis Sur les plaies du cœur, by Alphonse Sanson, published in 1827.

Wounds of the Aorta and Pulmonary Artery are more immediately and more necessarily fatal than wounds of the heart itself. The dense structure of the coats of these vessels, and their comparative thinness, renders it impossible to restrain in any degree the hæmorrhage following their wounds, while the muscular structure of the heart, and the thick substance of its ventricles, enables it in some cases to afford an obstacle to the escape of the blood. Musket wounds of these vessels I believe to be inevitably and almost instantly fatal—of which I have myself seen one remarkable instance. But patients are known to have lived for some time after punctured wounds, even of the aorta, of which two cases are referred to by Boyer, and another is detailed

by Dr. Niel of Bromberg, in the "Archives Générales" for May 1838.

Whenever there is any room for practice in wounds of the heart, or of the great vessels within the thorax, the surgeon's object must be to diminish, as far as is consistent with life, the quantity of the circulating fluid, and at the same time to obviate inflammation by repeated venesections and abstemious diet. These indeed are the leading objects in the treatment of all wounds of the thorax. Everything is here to be gained by depletion; and if to this we add the removal of spiculæ of bone from fractured ribs, pressing or likely to press upon the lungs — the securing of bleeding intercostals—the removal of balls, pieces of cloth, or other articles lodged in the thorax—and the obtaining a pervious opening for the exit of blood, air, or matter accumulated within the chest, everything is effected which reason can dictate, which sound judgment can recommend, or which the utmost efforts of surgery can accomplish.

WOUNDS OF THE ABDOMEN.

The principal danger of wounds of the abdomen is to be referred to the injury of large blood-vessels; to the extravasation of the contents of the different viscera, and to inflammation of the peritonæum—to which last occurrence, it has been stated, that nine-tenths of the deaths of those wounded in the belly are to be attributed, exclusive of those who perish from internal hæmorrhage. To account for this inflammation, the wound itself is now held to be sufficient, without having recourse to the action of the external air, which was formerly so much dreaded by surgeons, but which, in consequence of the complete occupation of the cavity by its natural contents, and in many cases the limited extent of the wound, is precluded from entering in any considerable quantity.

When wounds of the belly are not attended with the protrusion of any of the viscera, or the escape of any of the fluids or excrementitious matters contained in the abdomen, it is often a matter of doubt whether such wounds have actually laid open the cavity, and great anxiety is manifested by the patient or his friends to ascertain this fact—an anxiety, however, which no prudent surgeon will attempt to gratify by much probing, or by the preposterous expedient of throwing in injections, which has been proposed as a means of ascertaining this point. The most prominent symptoms of wounds of the abdominal viscera are, a weak and feeble pulse, great prostration of strength, tension of the abdomen, hiccup and vomiting—all of which symptoms may indeed occur in irritable or nervous habits even when a wound of the abdomen does not penetrate the cavity; but when these symptoms continue for any length of time to harass the patient, there is too much reason to suppose that the abdomen has been opened, and this is often rendered certain by the supervention of a particular train of symptoms, marking not only the injury of the organs within, but marking also, by the nature of the discharges, the particular organ wounded. In wounds of the stomach, hiccup and bloody vomiting are for the most part prominent symptoms; while discharges of blood with the fæces or the urine, both of which are in general voided soon after the infliction of wounds of the abdomen, indicate lesions of the lower intestine, of the kidneys, or of the urinary bladder.

When we consider the variety of organs contained in the abdomen, the great vascularity of some of them, as the liver and spleen, the acrid and irritating contents of others, as the gall and urinary bladders, the paramount importance of others, as the stomach, we see how readily patients are cut off by hæmorrhage from the first, by effusion from the second, and by a suspension of the functions of the third. The extensive sympathy existing between the abdominal viscera and other parts of the system through the medium of the great sympathetic nerve, is a circumstance which accounts for many phenomena occurring in wounds of these viscera, and which often leads to the death of the patient even sooner than he would sink from inanition, by a suspension of the

functions of the stomach, or by the accession of inflammation of the peritonæum. To the peculiar liability of this membrane to inflame, I have already observed that much of the danger and many of the fatal terminations of abdominal wounds are to be ascribed; but like other serous membranes, the form of inflammation which the peritonæum is most liable to assume is the adhesive, while the membrane lining the intestinal tube, like others of the mucous class, is most liable to the ulcerative inflammation. And here, as Mr. Travers has well observed, we have an irresistible evidence of the salutary provision of nature against the effects of disease. If the inflamed peritonæum had run directly into suppuration, ulceration of the containing parts would have been necessary for an outlet; and if the internal surface of the irritated bowel had tended to form adhesions, the canal would have been in frequent danger of obliteration.

Before proceeding to consider more particularly wounds of the floating, or what may be termed the tubular viscera of the abdomen, I shall advert to wounds of the parietes of the belly, and of what may be termed the fixed or glandular viscera. I have already had occasion to observe that wounds of tendinous parts are frequently followed by troublesome and dangerous consequences; and when we recollect the extensive tendinous expansions over the fore part of the belly, we cannot be surprised at seeing bayonet or other punctured wounds of this region followed by much constitutional disturbance, severe inflammation, and the formation of extensive abscesses. Such inflammation is best obviated in its early stages by the usual antiphlogistic measures, general and local blood-letting, low diet, gentle aperient medicines, warm bath, fomentations, or cold sedative applications, relaxation of the wounded parts, and perhaps enlargement of the puncture—a practice which is particularly recommended by the Danish surgeon Callisen in superficial punctured wounds of the abdomen; and which is undoubtedly more admissible and more advantageous here than in many cases in which early dilatations have been recommended. When suppuration occurs from wounds or contusions in this region, the matter does not readily point outwards, but extends under the fasciæ of the abdominal muscles, and between the tendinous layers.

Early incisions are therefore advisable whenever the existence of matter is ascertained.

In wounds penetrating the parietes of the abdomen, where no lesion of any of the internal organs is indicated, and where no protrusion of the viscera takes place, the surgeon's duty is plain and obvious. In slight cases of punctured wounds, the external opening may be covered with adhesive plaster; tension and swelling will be best treated by relaxation of the wounded muscles, and the application of leeches in the immediate neighbourhood of the wound, while inflammation of the peritonæum and internal parts is to be obviated by general bleeding, abstinence, and rest. The means of treatment I have just recommended are also applicable to incised wounds of a limited extent; and in addition to these, the employment of stitches becomes necessary in extensive incised or lacerated wounds. In sewing such wounds, the precaution may be taken of introducing the needle from the interior outwards, so as to avoid perforating any portion of the intestine, which might insinuate itself between the edges of the wound without protruding externally.

Of the utility of sutures in some wounds of the abdominal parietes, I am fully satisfied both from experience and from the observation of others, but it is proper to state that Baron Larrey has deprecated in strong terms the employment of gastroraphy. He speaks of it as an operation which ought to be banished from surgery, and even goes so far as to attribute the bad results of the Cæsarean operation to this piece of after treatment. We all know how strong and indelible early impressions are liable to become, and with all possible respect for the Baron's opinion, I cannot avoid thinking that he has taken up a hasty prejudice upon this point, from having witnessed the bad effects of sutures in a case treated by his uncle, where a maniac had made an extensive wound into his own belly. It is, at the same time, but justice to Baron Larrey to state, that he assigns reasons for objecting to the use of sutures in abdominal wounds, and particularly the difficulty of supporting the stitches by compress and bandage for want of a solid point of resistance in the subjacent parts. This, however, may be held by others as well as by myself an additional reason for having recourse to sutures. Mr.

Guthrie, it will be observed, in his valuable lectures on wounds of the abdomen, has recommended that, "in all simple wounds of the wall of the belly of moderate extent, the edges of the wound should be brought together by means of a small needle and a fine silk thread, passed through the skin and the loose cellular membrane only which is in contact with it, by a continuous suture without puckering." But hitherto the interrupted suture has been that more generally employed, and I am in the knowledge of several cases which have been treated successfully in this way.

In gunshot wounds of the abdomen the orifices made by the entrance and exit of the ball are, as in other cases, to be covered with light and simple dressings. In wounds made by musket balls there is seldom any tendency to protrusion of the viscera, and of course no surgical expedient is necessary to obviate this occurrence. Wherever balls, pieces of wadding, cloth, or other extraneous substances are felt within reach of the external orifice, it is proper to remove them, but this should not be done at the expense of adding much to the patient's present suffering, or of aggravating the subsequent inflammation. It should be recollected that numerous instances are on record of balls and also pointed weapons having passed through the cavity of the abdomen without apparently wounding any of the convolutions of the intestines. In other instances, balls, after having penetrated the parietes, have passed round the internal contour of the cavity, and have subsequently made their exit at a distant point, or remained lodged within the belly, whence they have afterwards been discharged by abscess, or by the natural outlets. With the knowledge of these facts, no one will waste his own time, or aggravate his patient's sufferings, by a protracted search after balls in this cavity, but will be ready to adopt the sentiments of Botallus; who, after detailing a case in which a ball entered a little above the right groin and remained in the abdomen during life, lays down the following practical rule for our conduct in searching after balls in this region:—"*Si inveneris educas, quoad si non sinito.*"

With reference to the extraction of balls lodged in any of the three great cavities of the body, it seems to me that when lodged within the cranium, their removal is most imperatively

required. Here the parietes of the cavity are wholly of a bony nature. There is no possibility of the ball being discharged by any natural outlet, or by ulcerating its way to the surface; and although many patients have survived the lodgment of a ball in the brain, it has never lain there with impunity, and in every case has, I believe, been sooner or later the cause of the patient's death. In the thoracic cavity the urgency of removal is somewhat less, inasmuch as the parietes of this cavity are partly bony and partly muscular, admitting of the possibility of a ball being discharged by the ulcerative process, or, where the body is of small size, finding its way into the bronchiæ, and being discharged by expectoration. Balls have also lain long in this cavity, imbedded in the vital substance of the lung, and even of the heart, without being the cause of the patient's death. In the abdomen again, the parietes being almost entirely muscular, there is a much greater chance of a ball making its escape by ulceration through the parietes, or of ulcerating its way into the intestines, and being discharged by stool, while, as we have just seen, balls have lain long in this cavity with comparative impunity.

Wounds of the Diaphragm may be classed amongst those of the abdominal parietes, but from the peculiar situation of this muscular partition, it cannot be wounded without the wounding body passing through one or other of the two cavities of which the diaphragm forms the common boundary. And when we consider the vital importance of the organs contiguous to the diaphragm both above and below, the heart and lungs on the thoracic, with the liver and stomach on the abdominal side, and when injuries of one or all of these organs are superadded to the wound of the diaphragm itself, it is matter of surprise that anything like a recovery should ever take place. Of this, however, we have more than one instance upon record, and it is remarkable that many of these wounds have given room for herniary protrusions. Amongst others, an instructive case is to be found in the 8th volume of the Edinburgh Medical Journal, recorded by Mr. Boyle, surgeon of the 62d regiment. Here no alarming symptoms supervened until many months after the infliction of the injury, but the patient was eventually carried off by the acces-

sion of inflammation of the intestine, which had been forced upwards, through the wound of the diaphragm, and lodged in the cavity of the thorax. Some years ago a patient was brought into the Royal Infirmary here moribund, and died in a few hours. On dissection a large accumulation of sero-sanguineous fluid was found in the left cavity of the thorax, the lung of that side compressed and shrunk, and the cavity in part occupied by a large portion, not less than a foot, of the colon, which had protruded upwards through a wound in the diaphragm. This wound it appeared had been inflicted fifteen months before, by a female with whom the patient cohabited, with a shoemaker's knife entering between the eighth and ninth ribs, where the cicatrix of a wound was distinctly perceptible. A still more remarkable case is that of Serjeant Berry of the 88th, of which the details are given by Dr. M'Crae in the 15th volume of the Medical Gazette, and of which the preparation is to be seen in the museum at Chatham. This man had been wounded in the neighbourhood of Fuentes d'Onor by a musket-ball passing through the chest, and which had occasioned an extensive breach in the diaphragm. Through this it appears that the stomach and colon had been protruded upwards, and upon the man's death, two-and-twenty years afterwards, was found lodged in the thorax. The symptoms which particularly indicate wounds of the diaphragm are acute pain, great anxiety, and oppression about the præcordia, with hiccup, and *risus sardonicus*. The treatment which naturally suggests itself is depletion, abstinence, and rest.

Wounds of the Liver, when they penetrate deeply into its substance, are for the most part speedily fatal, nor will this surprise us when we recollect how abundantly this organ is supplied with blood. The wounded ramifications of the hepatic artery, the vena porta, and hepatic veins are all sources of profuse hæmorrhage—a hæmorrhage which we have no mechanical means of effectually suppressing; and whether the blood finds an exit by the external wound, or accumulates in the cavity of the abdomen, a quantity is often lost sufficient to prove destructive to the life of the patient; but from slighter wounds of the liver recoveries are not unknown. When the patient survives so long as to admit of an adhesion

taking place between the surface of the liver and the lining of the abdomen contiguous to the wound, the matter which subsequently forms is precluded from access to the abdominal cavity, and the case is then assimilated to one of abscess of the liver, of which I have had an opportunity of seeing many. My success, however, in the treatment of these cases has not been such as to induce me to form, or to justify me in holding out, any sanguine hopes of success in the management of wounds of the liver. The fixed situation of this viscus gives us considerable facility in detecting its wounds, and the symptoms which more particularly characterise them, are a discharge from the wound of a bilious character, yellow and glutinous, and sometimes of the colour of bile, but of a thin serous consistence. To this is superadded derangement of the functions of the stomach and bowels, and in some cases a general and troublesome itching of the skin over the whole surface of the body, with a jaundiced state of the skin and urine. The medical treatment in wounds of this organ resolves itself into measures for obviating inflammatory symptoms, diminishing the ingesta, and insuring the regular evacuation of the bowels, chiefly by the use of the mildest purgatives and emollient clysters. The topical applications are leeches and fomentations.

Wounds of the Spleen are rare, insomuch that Baron Larrey has only seen three cases in the course of his extended experience. They are chiefly recognised by the site of the wound, and by the faintness, pallor, and coldness of the surface, denoting internal hæmorrhage, which the peculiar texture of this organ readily affords. We are also guided in our diagnosis by the absence of those symptoms, indicating wounds of the contiguous viscera, the stomach, the kidney, and splenic flexure of the colon. Wounds of the spleen *in situ* are to be treated by those means, to the use of which I have so often had occasion to limit my recommendations in the treatment of penetrating wounds of the great cavities, viz., bleeding and abstinence. The useless, not to say cruel experiment of removing the spleen, to which dogs have been so often subjected with unsatisfactory and contradictory results, has also, from necessity however, and not from choice, been performed on the human subject. Amongst others, a recent instance of this is given by Dr. MacDonnell in the 8th volume of the Trans-

actions of the Medical Society of Calcutta, the patient remaining well two months afterwards; and another case of excision of the spleen is recorded in the "Dublin Medical Press" for September 18, 1844, in which the patient is said to have survived for thirteen years and a half.

Wounds of the Kidney have been proposed, and said to have been voluntarily inflicted for the purpose of removing calculi; but although the operation of nephrotomy has been spoken of by some speculative writers, as a matter of course, yet every military surgeon knows the highly dangerous nature of wounds of the kidney, and we are reluctantly compelled to place them amongst the list of those which, for the most part, prove fatal. The situation, indeed, of the organ renders it impossible for wounds to be inflicted on it without at the same time injuring other parts of importance. In wounds reaching the kidney anteriorly, by penetrating through the abdomen, we have lesions of the intestine almost inevitably superadded to the danger from hæmorrhage, and extravasation of urine into the cavity of the abdomen. In wounds, again, penetrating the kidney laterally, or *a posteriori*, if the patient escapes the first danger from hæmorrhage, he has still to run the risk of extensive and deep suppurations, from the infiltration of urine into the lax cellular membrane surrounding the kidney. To this succeeds fistulous sinuses, for the most part accompanied with hectic, and generally terminating in death. Wounds of the kidney are marked by great pain in the lumbar region, bloody urine, retraction of the testicle, nausea, and vomiting. Their treatment consists in bleeding, both general and topical, mild regimen, and gentle laxatives, warm bath, and fomentations.

In considering wounds of the glandular or more fixed viscera contained in the abdominal cavity, I have endeavoured to point out the circumstances by which lesions of these different organs are characterised, the more immediate sources of danger in each, and the most approved means of obviating such danger. Our anatomical knowledge of the natural site and form of such fixed viscera gives us important advantages in detecting and treating their wounds; and I have endeavoured, upon this and every former occasion, to discountenance idle and useless probings, calculated to lead to no practical

advantage. I am well aware, however, that it is not easy for either patient or surgeon to divest himself of an anxiety to ascertain precisely the nature and extent of the injury sustained; nor is such anxiety to be altogether reprobated. When the viscera are wounded without protruding, and when the wound in the abdominal parietes is sufficient to admit the point of the surgeon's finger, this, of all others, forms the most manageable and most instructive instrument of research. But in lesions of the less fixed and floating, or tubular viscera, of which we come now to speak, such lesions are not unfrequently accompanied with protrusion of the injured bowel, rendering the nature of the case obvious. Protrusions indeed often happen through wounds of the abdominal parietes without any mechanical injury to the protruded part; and of parts liable to such protrusion, the omentum, from its situation and extent, is the most so, and next to this the small intestines. It is worthy of remark, that in fat subjects portions of the adipose membrane sometimes become entangled in the lips of the wound, and are liable to be mistaken for omentum.

When parts protrude through a narrow wound, they are liable to become strangulated, inflamed, and gangrenous, as in cases of hernia; and the natural practice in cases of protruded omentum, where the protrusion is recent, is to return it as speedily as possible to its natural situation within the abdomen, not losing time in fomenting the protruded parts previous to their return—a practice advised by some authors, without recollecting, that no fomentation whatever can possibly be so beneficial as the natural warmth and moisture of the abdominal cavity. In facilitating the reduction of protruded parts, whether of omentum or intestine, we find the advantage of relaxing the abdominal muscles as completely as possible. When it becomes necessary to enlarge the opening in the abdominal parietes for the reduction of protruded parts, this may be done with a director and curved bistoury, carrying the incision as far as possible parallel to the muscular fibres, and in such a direction as to avoid crossing the course of the epigastric artery. When portions of omentum have been for some time protruded, they are occasionally found adhering to the lips of the wound, and may be removed by ligature or

excision; but whether this be done or not, the protruded part will ultimately slough and drop off, so as to prevent its becoming an obstacle to the closure of the wound.

Wounds of the Stomach are not necessarily mortal, although we can never look upon them as devoid of the utmost danger, particularly if inflicted towards its pyloric extremity, or in the course of the great vessels running along its curvatures. No organ in the whole animal economy seems to possess greater powers of adapting itself to circumstances than the stomach, both in man and in the inferior animals. The numerous instances of foreign bodies, such as stones, and even knives introduced into the human stomach; the sword swallowing, a feat of the Indian jugglers, which I have often seen; the enormous balls of matted hair found in the stomachs of cattle; and the history of the lamb mentioned in Captain Bligh's voyage, which subsisted on animal food, prove to us that the stomach, an organ so essential to the existence of the individual, is not easily deprived of its vitality, by the introduction of substances altogether foreign to its usual contents; and the incisions purposely made for withdrawing such substances, as well as the injuries inflicted by the usual accidents of war, prove also that the stomach is capable of sustaining and repairing the consequences of very formidable wounds.

We are indebted to Dr. Beaumont of the American army for the case of his patient Alexis Martin, who in 1822 received an extensive wound of the stomach, which still continues open, giving an opportunity for many interesting experiments and observations. Martin, subsequent to the wound, enjoyed the best health, has performed the duties of a labourer, has married and become the father of a family. An interesting case detailed by Dr. Marcet, in the Medico-Chirurgical Transactions, gives an example of a sailor who continued occasionally, for a succession of years, to entertain his comrades by swallowing knives; and of the successful extraction of knives from the human stomach, we have the well-known case of the Prussian peasant, operated on at Konigsberg upwards of two hundred years ago, as well as a more recent one mentioned by Baron Larrey, in which M. Frizac successfully performed this operation at Toulouse. In these operations the opening was naturally made into the anterior part of the stomach, where it

lies near the surface of the body, and it is chiefly when wounds occur in this situation that we are to look for a favourable result. Baron Percy, in estimating the fatality of wounds of the stomach, calculates that four or five out of twenty have escaped —a proportion of success with which the Baron has certainly abundant reason to be satisfied; and which the success of others will hardly warrant us to expect. Out of about 3000 cases of gunshot wounds, Mr. Alcock states that he had only seen one case of recovery after the stomach had been penetrated by a musket ball.

Wounds of the stomach are detected by the direction of the wounding body; by the depth to which it has penetrated; by the occurrence of nausea, retching, and bloody vomiting; and not unfrequently by the discharge of food or drink through the wound. When the wound is of a limited extent, no attempt to close it mechanically is admissible, but when an extensive opening is made with a clean cutting instrument, the facts upon record seem to justify, and to demand the mechanical closure of the wound, by means of the glover's suture, or the suture recommended by Lembert, which I shall immediately have occasion to describe. In addition to this, we have recourse to blood-letting, general or topical, as circumstances may demand; to laxative and nutritious clysters; the most mild unirritating food in small quantity; and avoiding, of course, the introduction into the stomach of those nauseating and purgative medicines, from which we derive essential aid in other cases of inflammation. Under such treatment, wounds of the stomach, if not immediately fatal, are in a few cases speedily healed; in others they degenerate into fistulous openings, continuing sometimes for many years.

Wounds of the Intestine.—Before considering these, it is necessary to point out the propriety of immediately reducing any portion of the gut which may be protruded without being wounded. Even when this may have prolapsed for some time, and may in consequence be much inflamed, the reduction is to be immediately effected. The greater difficulty there may be in accomplishing this, the more obvious its necessity becomes; for it will readily be perceived that the inflammation is likely to be greatly aggravated by that degree of stricture which prevents the return of the bowel. It has

been proposed to make numerous small punctures with a needle in the protruded gut for the purpose of permitting the contained air to escape, and thereby diminish its bulk and facilitate its reduction. The slightest experience, however, of this expedient will show that it is insufficient to attain the object in view, and although sanctioned by the names of Chopart and Desault, I am compelled to state, from personal observation, that the apertures, even if much larger than those made by a needle, are speedily closed by the protrusion of the mucous coat. If, again, these apertures are extended to a size sufficient to ensure the escape of the contained air, they will be so many distinct wounds in the intestine, each of them infinitely more dangerous than a prolongation of the external wound, which is the most eligible way of returning the protruding bowel.

Wounds of the small intestines are, for the most part, either primarily or secondarily fatal, while those of the large intestines sometimes heal without difficulty. This fact has not escaped the notice of the older writers, for they pronounced wounds of the latter dangerous in the highest degree; those of the former, without exception, fatal. The symptoms indicating wounds of the intestinal tube are a small and tremulous pulse; paleness of the countenance; great prostration of strength, and tendency to syncope; the discharge of blood with the stools; and the escape of fœtid air or fæcal matters from the wound, which unequivocally show the nature of the injury. But however urgent these symptoms may be, if the wounded bowel be not protruded, we must rest satisfied as to treatment with the employment of general remedies, bleeding, abstinence, and rest. No man in his senses would think of enlarging the external wound for the purpose of searching out and sewing up the wounded part of the gut—a practice, the propriety of which is not universally admitted, even when the wounded intestine protrudes externally. Extravasation of the contents of the bowels within the peritonæum is by no means so liable to occur as speculative writers would lead us to imagine, and when it does happen to any extent, the case may, for the most part, be abandoned as hopeless.

Mr. Travers, in his Essay upon Injuries of the Intestines, has shown distinctly the phenomena which wounded intestines

present, and the processes adopted by nature in the repair of such injuries. From this inquiry it appears, that "if a gut be *punctured*, the elasticity of the peritonæal coat, and the contraction of the muscular fibres, tend to open the wound, while the villous or mucous coat forms a sort of hernial protrusion and obliterates the aperture; if an *incised* wound be made, the edges are drawn asunder and reverted, so that the mucous coat protrudes in the form of a fleshy lip; if the section be transverse, the lip is broad and bulbous, acquiring tumefaction and redness from the contraction of the circular fibres behind it; if the incision is according to the length of the cylinder, the lip is narrow, and the contraction of the longitudinal resisting that of the circular fibres, gives the orifice an oval form; and of these two last-mentioned incisions, the longitudinal and the transverse, it appears that the former are most easily repaired." How far art can be useful in promoting such repair, and what the form of suture best calculated to promote it, have been subjects of very warm discussion. This discussion, however, like many others relative to wounded intestines, has been chiefly grounded on experiments instituted on brutes, and not on the practice of those most employed in the treatment of wounds in the human subject. Those who have been so employed are well aware that some of the accidents which the older surgeons expected to obviate by the employment of sutures, the falling in of the wounded intestine, and the effusion of its contents into the cavity of the abdomen, are occurrences extremely rare.

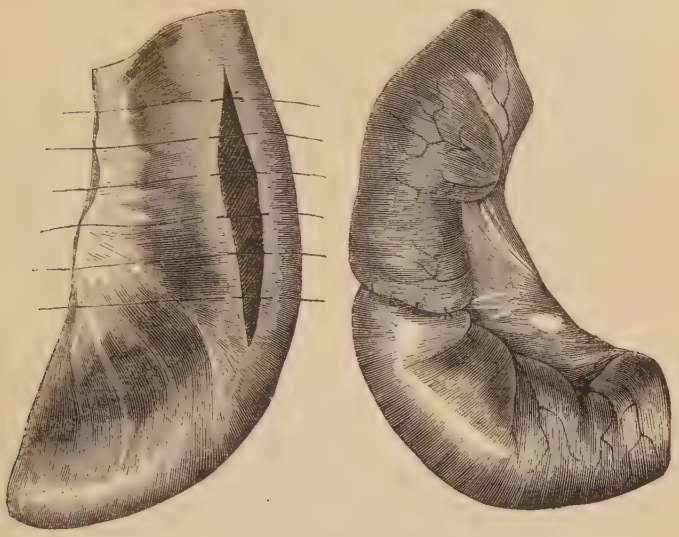
The whole process of nature in repairing injuries of the intestinal tube, and the mode in which she disposes of the ligatures employed in securing a wounded intestine, are fully explained in Mr. Travers's essay, from which it appears that, whether we employ the continued suture, as recommended by this author, or the interrupted, as recommended by others, the threads ulcerate their way into the canal, and are discharged by stool. In a large proportion of cases of wounded intestine, patients are little indebted to the mechanical aids of surgery, as many instances are recorded, in which penetrating wounds of the abdomen, involving several plicæ of the intestines, have been treated chiefly by abstinence and rest; and the fortunate termination of some of these cases shows us

what wonderful exertions nature makes to relieve every injury inflicted on her, and how often these exertions are successful, if not interrupted. The older surgeons were averse to leaving any thing to nature, although, as Dr. Hennen observes, their own practice of universally employing sutures should have taught them how much she could bear with impunity. Mr. John Bell has broadly asserted, that "if there be a work of supererogation in surgery, it is the sewing up of a wounded intestine." And he contents himself with recommending that the edge of the wounded gut should be united by a single stitch to the edge of the wound in the parietes. Mr. Travers again asserts, that the union of a divided bowel requires the cut extremities to be kept in contact throughout their whole circumference, and for this purpose recommends a continued suture, with a small sewing needle and silk thread.

Amidst these conflicting opinions, it is consolatory to know how few cases occur in which sutures of any description are required. I myself have seen but one case in which I deemed it necessary to follow the practice of Mr. Bell, in stitching the wounded gut to the edge of the wound in the parietes; and Dr. Hennen asserts, that in the course of his more extensive experience, only two cases have occurred in which he thought it necessary to follow a similar practice. This is the mode of treatment which I have, until lately, been inclined to advocate as the step best calculated to save the life of a patient, although at the hazard of producing an artificial anus; but my attention has recently been turned to a mode of sewing up a wounded intestine, which obviates many of the objections to that operation. This new mode I have been in the practice of showing for some years past to my class; and am induced to notice it from a desire to ascertain its real value in practice.

Of this operation, a detailed account is to be found in a paper by M. Lembert, in the second volume of the "Repertoire Générale d'Anatomie et de Clinique Chirurgicale." A small stitch, including only the peritonæal coat of the intestine, is to be taken up with a common sewing needle and silk thread on one side of the wound, at the distance of a line or two from its edge, the needle is then carried across the wound,

and a similar stitch taken up on the opposite side, at the same distance from its edge; in this way a number of ligatures are



introduced at the distance of a quarter or half an inch from each other, and when these come to be tied, the wound is completely closed, the serous surfaces of the peritonæal coat on either side of the incision are brought into contact, the lips of the wound are inverted and left projecting into the intestinal tube. In this way the continuity of the canal was restored by Dieffenbach after the excision of a considerable portion, three inches, of the gut. So far as we can judge of this mode of suture, from the above case, and from the experiments of Lembert on the inferior animals, it promises to be highly successful; but as we cannot always calculate upon equally favourable results in the human subject, I am desirous of seeing this kind of suture tried in accidental wounds of the intestine in man, and have therefore been induced to describe the operation particularly, and to refer to the above work, in which it is more fully illustrated.

Apertures in the intestine, whether the consequence of wounds or of sloughing in cases of hernia, are extremely apt to become fistulous, and to give vent to the contents of the bowel, through what is termed an artificial anus. The danger of these apertures diminishes nearly in proportion as

their distance from the pyloric extremity of the stomach increases, and I have seen several of them ultimately close without any surgical treatment whatever; others have seemed to derive benefit from being touched occasionally with lunar caustic, or with the actual cautery. The ingenious proposal of Dupuytren, for the treatment of artificial anus, is fully detailed in his memoir on this subject, and is best explained by shewing his contrivance for restoring the continuity of the intestinal canal; but as my own experience does not enable me to speak satisfactorily of the merits of this proposal, it seems unnecessary to dwell upon it here.

Wounds of the Bladder, passing through that portion of it which is covered by the peritonæum, and giving place to the escape of urine into the cavity of the abdomen, are, I apprehend, inevitably fatal, at least I know of no instance of recovery from such a wound, and Baron Larrey states that, although he has had occasion to give his assistance to many soldiers wounded in this way, they have all died within forty-eight hours. As an instance, however, of the extraordinary efforts of nature, even in circumstances the most unpromising, I may advert to a case noticed in the "Archives Générales" for June 1834, where the patient survived a rupture of the postero-superior part of the bladder for seven days; died at the end of that time from a surfeit, and upon dissection it was found that an attempt had been made by the effusion of lymph to circumscribe the extravasation and to form a new reservoir for the urine. Bayonet and musket wounds in the lower part of the bladder, although complicated with fractures of the bones of the pelvis, with severe injury to the soft parts, and even with wounds of the intestines, are by no means necessarily nor immediately fatal. I have seen a patient survive a musket wound with all these complications for fourteen days; and Dr. Thomson in his report on the state of the wounded after the battle of Waterloo, mentions no less than fourteen cases of wounds of the bladder, some of them of a very complicated kind, which were in the progress of recovery. Wounds of the bladder are for the most part readily developed by the escape of urine from the wound, or by its infiltration into the contiguous cellular membrane, to prevent which is a paramount object in the treatment; and with this view, the introduction

and lodgment of a catheter in the bladder is always desirable. We proceed here, as in other cases, upon the principle of allowing the wounded viscus to remain as much as possible at rest, to obviate the necessity of its alternate distension and contraction, and to prevent the farther escape of urine into the surrounding parts. In addition to this, the usual antiphlogistic regimen, bleeding, warm bathing, gentle laxatives, and clysters, are often requisite. By such treatment, the inflammatory symptoms are kept under, the wounds become fistulous, and ultimately heal.

In the event of musket balls, slugs, or fragments of bone lodging in the bladder, they often become the nuclei of stones, and we are under the necessity of removing them by an operation. Of the satisfactory results of such an operation we have now many instances; and one of the earliest of these cases, which occurred in the person of a soldier of the Irish Brigade, is remarkable as having been operated upon by the celebrated Frere Jacques, at Versailles, in 1698. In this case a stone was extracted, the nucleus of which was a musket ball which had been lodged in the bladder five years. In a recent case of this kind, a staff-surgeon in the service underwent an operation for the removal of a ball from the bladder, which was successfully accomplished. In a still more recent case, a ball, encrusted with calculous matter, of which a cast is to be seen in the museum, was successfully extracted, although in the first instance an operation was rendered fruitless, in consequence, as I have been informed, of the ball, which had entered from behind, having lodged under the pubis, and become partially encysted. The case of a soldier of the 24th Regiment, who had a ball lodged in his bladder at the battle of Chillianwallah, and successfully extracted, has been detailed in a recent volume of the "Medico-Chirurgical Transactions," by Mr. Dixon, of St. Thomas' Hospital, to whom we are indebted for notices of fifteen other cases in which a similar operation had been performed.

The operation for the removal of foreign bodies from the bladder is in all respects akin to that for the stone, and the general superiority of the lateral operation over every other appears to me fully established. It may always be advantageously performed by a staff and straight scalpel, making the

direction of the internal incision through the prostate and neck of the bladder to correspond nearly with the external incision; and to this mode of operating it becomes army surgeons, above all others, to habituate themselves, as they cannot expect to have the command of any of those complicated contrivances which have been devised with a view to facilitate this operation. The different steps of the lateral operation for the stone I am in the habit of exhibiting to my pupils upon the dead body; but as these are shewn in every surgical class, and as the symptoms and treatment of urinary calculi are minutely detailed in the common systematic works on surgery, and in numerous monographs on the subject, it would be superfluous to enlarge upon them in these outlines, particularly as the stone is a disease extremely rare amongst soldiers and seamen. During a period of nearly fifty years' connection with the service, I have only met with two cases in which stones were ascertained to exist in the persons of soldiers; and since this work was first published, other two cases have been reported to me, which occurred in the 98th, and were successfully operated upon by Mr. Bardin, the surgeon of the regiment. The following extract from Dr. Yelloly's paper on the tendency to calculous disease, will shew that in this respect my own observation coincides with that of the most experienced army surgeons:—"In a valuable report published by Sir James M'Grigor on the diseases of the British army in the Peninsula, under the command of the Duke of Wellington, no case of calculus appears to have presented itself during the period of which he treats, viz., between December 1811 and June 1814, though above 340,000 cases were admitted into the general and regimental hospitals during that period.

"In the last fifteen years, Sir James informs me that four cases only of calculus have occurred in the English army in Britain; and Mr. Crampton, the surgeon-general of Ireland, states that one example of lithotomy only, in which the operation was performed by himself, has occurred within the same period in the army of Ireland. I am, however, able to add to this, on the authority of Dr. Pitcairn of Cork, the case of an officer of the Scots Greys, whom I had occasion to visit at the barracks here, who was operated upon at Cork by Dr. Woodriffe about two years since on his way to join

his regiment. Mr. Crampton likewise informed me, on the authority of Sir James Wylie, physician to the late Emperor of Russia, that calculous diseases are hardly known in the Russian army.

"The Baron Delessert of Paris has done me the favour to procure from the Baron Larrey, and M. Gama, surgeons-in-chief to the great military hospitals of Gros Caillou and Val de Grace, in the French metropolis, a report as to the prevalence of calculous complaints among the French soldiery. The Baron Larrey states, that in the course of thirty years only five operations of lithotomy have been performed at the Gros Caillou (four of which were on soldiers, and one on a soldier's child), and one operation at the Val de Grace. M. Gama states that during six years that he has been surgeon-in-chief of the military hospital of Val de Grace, and eight previously that he exercised the same functions in the military hospital at Strasburg, he has not once had occasion to perform the operation of lithotomy. He mentions, likewise, that the disease is very rare in the army generally; and that no case of stone operation has occurred to him during any part of his extensive military service."

Mr. Copland Hutchison has made a very minute and extended research into the frequency of calculous complaints amongst seafaring people, from which it appears, that amongst the whole mass of seamen composing the British navy, from the beginning to the end of the last war, embracing a period of sixteen years, only eight cases of urinary calculus occurred, being in the proportion of only one such case to ten thousand seven hundred and fifty patients admitted into the naval hospitals.

Having now pointed out the objects most deserving of attention in wounds of the abdominal viscera, it may be right to avail myself of this opportunity to advert to the subject of *Hernia*, with the double purpose of explaining, on the one hand, why I do not hold it necessary, in a course of Military Surgery, to go minutely into the symptoms, pathology, and treatment of hernia, and, on the other, to urge the advantages of an early operation whenever it shall be necessary to resort to this means of relief. In the sixth volume of the "Recueil des Mémoires de Médecine, et de Chirurgie Militaires," we

have some reflections by Savreux, surgeon-major of the legion de l'Orne, on the impossibility of a soldier serving actively when afflicted with hernia. He there points out the various risks to which he is exposed, and concludes, "que tous ceux qu'atteint cet infirmité sont physiquement impropres à tout service militaire actif."

The propriety of excluding from the army every individual afflicted with this malady, or whose bodily conformation gives reason to anticipate it, has already been pointed out; and whenever hernia supervenes upon an individual engaged in the service, although, by the existing regulations, he is not directed to be discharged, yet he can scarcely ever be looked upon as an efficient soldier, but should be selected for some light duty, or transferred to a garrison establishment. Hence it happens that hernia, in the only state in which it acquires peculiar interest as a surgical disease, namely, in a state of strangulation, seldom presents itself to the military surgeon. I know many medical officers of the army, of long standing, who have never met with a case of strangulated hernia, and the comparative frequency with which it has fallen under my own observation in civil and in military practice offers a remarkable contrast. Indeed the whole history of my experience of strangulated hernia is singular, and not uninstructive. I had not been many hours an apprentice when I had occasion to witness an operation for strangulated hernia, and thus early impressed with the hazardous character of the disease, I embraced every opportunity of making myself acquainted with its nature. While assistant to the late Dr. Barclay, at a time when the publications on hernia by my colleague Dr. Monro, by the late Mr. Hey of Leeds, and by Sir Astley Cooper, had rendered the subject one of extreme and universal interest to myself and to my fellow-students, I laboured hard to become acquainted with the numerous fasciæ which have been described, with the anatomy of the ring, the course of the epigastric artery, its relative situation to the spermatic chord and to the hernial sac in inguinal hernia; the general distribution and anomalies also of the obturator artery, with its relations to Gimbernat's ligament, and to the neck of the sac in crural hernia. With all this information I entered the army, and served for thirteen years

without ever meeting with a case of strangulated hernia, save one, which was speedily reduced by bleeding and the warm bath.

Circumstances were very much the reverse when I entered upon my duties as surgeon to the Royal Infirmary here. Before I was many months in office a case of strangulated hernia presented itself, aggravated, as many such cases are, by protracted and unavailing efforts at reduction by the taxis. I immediately proceeded to operate, with a strong conviction of its necessity, but with very blunted recollections of the minute anatomy of the parts, and without ever having witnessed the operation on the living body, except in the case which occurred the first day of my apprenticeship. The result, however, was favourable, and it so happened that, with two or three exceptions, every case of strangulated hernia requiring operation which came into the house for the next three years fell to my lot, and amongst them one of that singular variety of the disease termed *Hernia Infantilis*, of which a notice is given in the 25th volume of the Edinburgh Medical Journal. In summing up my observations on one of these cases in a clinical lecture, I expressed myself to the following effect:—My observations on this case were chiefly intended to apprise you of what I have found to be the most common difficulties in the treatment of this disease. First, the diagnosis between hernia and those tumours with which it is liable to be confounded; and, secondly, the diagnosis between the hernial sac, and its contents.

In illustration of the former point, I noticed several mistakes which had fallen under my own observation, and instanced two cases in which everything was prepared, and the surgeon about to operate, when I had the good fortune to suspend his proceedings; and both cases turned out to be glandular swellings in the groin, accompanied with an accidental obstruction of the bowels, and some febrile excitement in the system. In illustration of the second point, the difficulty of distinguishing between the hernial sac, and the bowel which it contains, I mentioned to you that in one of my earlier operations for a strangulated femoral hernia, where the tumour was very small, and the fascia propria thick, I mistook the latter for the hernial sac, dilated the stricture in the crural arch, and pushed up what I conceived to be the intestine into the cavity of the abdomen; but the symptoms of strangulation

continuing, my patient died, and on dissection, I had the mortification to find a small portion of the ileum still impacted in the neck of the sac.

When the sac has been successfully opened, and its contents fairly displayed, the difficulty of the operation is in a great measure at an end; but you are all aware that the fear of wounding the epigastric artery in relieving the stricture has been one of the great bugbears in this operation, and this fear has, I believe, had a most injurious effect in the treatment of strangulated inguinal hernia. I illustrated by a diagram the true position of this artery, and shewed you that when the hernia enters the superior aperture of the inguinal canal, and descends along its course, constituting the oblique, or what Hesselbach terms the external inguinal hernia, the artery lies on the pubic or mesial side of the neck of the sac. When the hernia again protrudes directly through the lower aperture of the inguinal canal, forming the direct, the ventro-inguinal, or what Hasselbach terms the internal hernia, the artery lies on the iliac or lateral side of the neck of the sac. In one or other of these situations this vessel is always to be found, and, of course, by avoiding them both, by cutting neither outwards nor inwards, but directly upwards, parallel to the linea alba, you will in all cases avoid this artery; and for this practical rule in operating you are indebted to Sir Astley Cooper, to whom his profession is under so many important obligations.

In support of the opinion which I gave, that the risk of wounding the epigastric artery had been very much overrated, I mentioned the fact, that even among the older writers, who were in the habit of making more extensive incisions than are now thought necessary, we find few or no instances of hæmorrhage from wounds of the epigastric; and I stated that, in conversing with the most experienced of my brethren here, I could not find that any one of them had met with a serious or fatal hæmorrhage from wounding the epigastric in this operation. With the view of encouraging you to have speedy recourse to an operation in strangulated hernia, I took the liberty of pressing upon your attention the result of the cases which I have lately had occasion to treat in this house. Of seven patients upon whom I have now operated in the hospital, six have been saved, and this I attribute entirely to the

early period at which the operation has been undertaken. I would have you to recollect the uncertainty of all other means of relief, and to bear in mind the very just observation of Janson, that we can never foretell what we are to find in a hernial tumour. "Nous dirons à ce sujet, qu'on ne peut jamais preciser au juste ce qu'on recontrera dans une tumeur herniare." I would have you to believe that this is a disease in which many patients are lost from procrastination, but comparatively few from any untoward occurrence in operating, and I would have you to look upon these as a class of cases in which error is perhaps as excusable as delay. I have now operated in all, fourteen times for strangulated hernia, without having once been able to recognise in practice the various fasciæ with which I was formerly so familiar, and without having once seen, felt, or wounded, either the epigastric or obturator artery, which in my earlier days were looked upon as the great sources of danger. From all this I conclude that the occurrence of strangulated hernia in military practice is very rare, that the danger of the operation has been overrated, and its difficulties in some measure misconceived.

But to return to wounds of the belly. These, it may be observed, are complicated in proportion to the great variety of organs which it contains, and dangerous in proportion to the importance of these organs in the animal economy; and while, upon general principles, we should be ready to pronounce all penetrating wounds of this cavity inevitably fatal, yet when we descend to particular cases, we have such strange examples of unexpected cures, that we are ready to believe that scarcely any wound is fatal. In the treatment of many of these wounds, the surgeon's duty is exceedingly simple. It must ever be recollected that bleeding from the arm is the best preservative from internal bleeding and peritonæal inflammation, the two great sources of danger in wounds of the abdomen. Quietness, rest, opiates, severe and rigid abstinence, with warm fomentations to the belly, and laxative clysters, are powerful auxiliaries to blood-letting. When we have a sound portion of gut protruding from the belly, our business is to put it back, and close the external wound. When we have a wounded intestine protruding, the steps most obviously calculated to preserve the patient's life, are to return the

uninjured part of the bowel, and either to close the wound of the gut in the way described by Lembert, or to stitch the wounded point to the wound in the abdominal parietes. In lecturing on this subject, I have always, on the one hand, endeavoured to repress a too officious interference with the processes of nature; while, on the other, I have endeavoured, by the narration of some extraordinary recoveries, and by a reference to others, to show how cautious we ought to be in pronouncing any injury absolutely mortal, and what encouragement we have to persevere to the last in our efforts at relief.

In wounds of the trunk, both those of the thorax and abdomen—cavities filled with organs essential to life—every recovery must in some measure be looked upon as an escape; "and so carefully have these escapes been recorded in the annals of surgery, that in searching the records of our profession, the diligent student is apt to lose sight of the general fatality of such wounds, and he reads of cures till he forgets that there are dangers." But the sources of danger are numerous and complicated, are both present and remote; hæmorrhage in the first instance, from vessels concealed and inaccessible, inflammation supervening, and extending rapidly over the lining membranes, and internal suppurations, profuse in quantity, and little accessible to the efforts of surgery. Depletion, with its powerful auxiliaries, abstinence and rest, constitute much of the surgical treatment of patients wounded in the trunk. The removal of extraneous bodies when easily accessible, by the finger, the probe, or the forceps, is obviously consonant to the dictates of common sense. The removal of foreign bodies, the return of prolapsed parts, and securing them as far as possible in their natural situation, are almost all that the surgeon has to do in the way of operation.

In the treatment of wounds of the three great cavities, it is of the utmost importance to keep constantly in view the functions of the respective organs lodged within. In addition to the general measures of depletion and abstinence applicable alike to them all, we should act upon the principle of giving the wounded viscus the least possible cause for exertion in the exercise of its peculiar function. In wounds of the head, quietness and exemption from mental exertion should be enjoined. In wounds of the thorax, the circulating fluid should

be reduced, with the view of diminishing the effort which the heart is called upon to make in circulating, and the lungs in oxygenating the blood. In wounds of the abdomen, again, the diminution of the ingesta, to the smallest possible quantity consistent with life, is eminently calculated to facilitate the repair of injuries of the chylopoetic viscera.

WOUNDS AND FRACTURES OF THE EXTREMITIES.

Many of the general observations which have already been made on wounds of the soft parts, apply particularly to wounds of the limbs, and a very brief recapitulation of these is all that seems necessary, previously to entering upon the consideration of those injuries which involve the bones.

While severe cases of lacerated, contused, or gunshot wounds of the limbs lead to the question of amputation, simple incised, or punctured wounds, can seldom, perhaps never, be a cause for the immediate performance of this operation. Such wounds indeed, when confined to the muscular parts of the limb, and not complicated by the division of large blood-vessels, the fracture of bones, or the opening of joints, are for the most part devoid of danger, and may be successfully treated by the judicious employment of plaster and bandage, along with a favourable position of the limb; and this position is that which relaxes the wounded muscles, and obviates the gaping of the wound. A little reflection will shew that this object is in many cases more easily accomplished than might at first be imagined. An incised wound inflicted with the sabre on the arm or thigh, where the bone lies embedded in the centre of the muscular substance, provided it does not penetrate or fracture the bone, is of course confined to less than half the thickness of the limb. If, therefore, the sabre strikes in such a position as to divide the flexor muscles, the wound is confined to these, the extensors remaining unhurt, and *vice versa*, so that we cannot in such cases have those muscles which naturally antagonise each other divided by the same blow. Perhaps I ought to except from this general view

of the subject, wounds penetrating transversely across the calf of the leg, where nearly the whole muscular substance, more than half the thickness of the limb, is found on its posterior or popliteal aspect. Here, however, we are still enabled to carry into effect our views of approximating the lips of the wound, by bending the knee and extending the ankle joints, so as to relax the wounded muscles.

Where an extensive sabre wound has cut across the principal arterial trunk supplying a limb, we seldom have an opportunity of tendering our services in due time to save the patient, and the hæmorrhage will of course be accelerated in proportion as the wound is nearer to the trunk of the body. In cases, however, where an opportunity is afforded of tying a bleeding artery, it becomes our immediate and indispensable duty to do so, whatever may be its size. The possibility of the limb being nourished by the anastomosing branches, even when the largest arteries are tied, is now too well established to render it necessary for me to recur to this subject, or to recapitulate those observations and arguments by which Mr. J. Bell has so triumphantly rebutted the aphorism of Gooch and his predecessors already quoted.

Another injury from extensive sabre wounds, is the division of the principal nerves of a limb, and from this circumstance the nutrition and perfect functions of the member are more endangered than from the division of the principal artery. Wasting and paralysis, more or less complete, are indeed common occurrences from the division of the nerves of an extremity; but the division of such nerves calls for no surgical expedient, nor does our art hold out any particular means of obviating these consequences; at the same time, the cutting across of a principal nerve, is not a reason sufficient for the immediate removal of the limb, and our duty still is to endeavour by every means to procure reunion.

We have some remarkable instances of sabre wounds dividing the bones as well as the soft parts of an extremity, and even in such cases useful limbs have been saved. Of this an interesting case is given by Baron Percy, in the paper formerly quoted, on the reunion of separated parts, in which he states, that at the affair of Arlon, under General Delaage, a person named Thiery received a blow from a sabre in the right arm, by which the whole substance of the arm

was divided, with the exception of a small portion of the soft parts, in which fortunately were the artery and nerve. A cure was accomplished in three months, when the bone, the flesh, and the skin, were found to be firmly united; and although the arm remained long in a feeble state, the patient was ultimately enabled to devote himself to agricultural pursuits, in which he had been previously employed.

A case still more remarkable, inasmuch as the artery was divided along with the bone, was communicated to me by Mr. Stevenson of the Madras army; and the following is an abstract of it from a minute diary kept by Mr. Stevenson. A Jemadar of the Nabob of Masulapatam, received a sabre wound, passing obliquely across the arm, dividing the belly of the biceps muscle and the bone. The attendants described the stream of blood as having been very profuse, and projected several feet, from which circumstance, and the absence of all pulsation at the wrist, it was concluded that the artery was divided. The hæmorrhage was stayed in the first instance, by a turban wrapped tightly round the arm; and as the Nabob firmly opposed the amputation of the man's limb, the turban was cautiously removed, the lips of the wound approximated, a splint placed under the arm, and a tourniquet applied loosely on the upper part of it. No hæmorrhage supervened. The pulse was barely perceptible at the wrist on the third day. On the twenty-sixth day the wound was nearly all cicatrised, on the forty-fifth the bone was firmly united; but as might have been expected, the arm that was saved proved of little use.

In punctured wounds of the extremities, it may be remarked that the bayonet or pike, even when it passes completely through, does not penetrate the member in its longest diameter the point being turned to one side or the other by the bone; and hence the muscles directly opposed to each other are seldom implicated in the same wound. The danger from immediate hæmorrhage in punctured wounds is greatly less than that from incised wounds, even when the principal blood-vessels are opened, because the nature of this wound affords a much less ready exit to the blood, and renders more effectual those expedients naturally resorted to in such cases. This does not, however, diminish the risk attendant upon such wounds; for even although the primary hæmorrhage should

not prove troublesome, and although the external wound should close, we may still have an aneurism formed from the puncture of an artery. Besides the formidable consequences from wounds of the arteries, the more common effects of punctured wounds of the extremities are those formerly noticed —inflammations of the faciæ leading to extensive and deep-seated collections of matter, or to the occurrence of tetanic affections. Careful reflection, however, induces me to conclude, that the risk of tetanus from punctured wounds has been overrated, and in confirmation of this opinion, it has been stated to me by Mr. Marshall, that amongst the cases of arrow-wounds which fell under his notice in Ceylon, amounting to about one hundred, not a single instance of tetanus occurred.

The bad consequences of punctured wounds were formerly attempted to be obviated by the scarification or dilatation of the wound at the first dressing. This practice is now, however, abandoned, at least by the English surgeons, and the dilatation of the wound is deferred until in the progress of the cure it may become necessary, or some distinct object shall be attainable by it, and until we shall distinctly perceive in what direction it may be made with most advantage. In a punctured wound of any of the extremities, where no motive exists for its immediate enlargement, such as the securing of a bleeding artery, its orifice is to be lightly covered, and perhaps a compress laid along its course, secured by a roller very moderately tightened. In many instances, by this simple treatment, we shall have the satisfaction of finding the wound unite throughout its whole extent. When severe pain, swelling, and tension occur, these symptoms are to be obviated by local blood-letting, fomentations, cataplasms, and perhaps dilatation of the wound.

Those severe wounds of the extremities inflicted by shot and shells are not only accompanied with injury to the muscles, the blood vessels, and nerves, but it is by the extreme violence done to the bones that such wounds are more peculiarly distinguished. Very extensive breaches in the muscles of a limb from a gunshot wound are often speedily repaired under the most simple treatment; but when such a wound is complicated with injury of the principal blood-vessels and nerves, the case becomes peculiarly hazardous, even indepen-

dently of the hæmorrhage. Although this may be successfully controlled in the first instance, yet we know from experience, that musket wounds which injure the main artery of a limb, are very frequently followed by gangrene, probably, as suggested by Mr. Guthrie, from the neighbouring veins and nerve being involved in the injury; and perhaps also from the swelling and tension, consequent upon the wound, impeding the passage of the blood through the anastomosing vessels to the lower part of the limb, as explained by Mr. Turner in his valuable paper on Obstructions of the Arteries, in the Transactions of the Medico-Chirurgical Society of Edinburgh.

The complete escape of an artery lying in the track of a ball has often surprised army surgeons, and where the elasticity of the artery enables it to recede, and to escape with a partial injury of its coats, it does not necessarily follow that sloughing and hæmorrhage shall be the result. In such cases the coats of the artery sometimes inflame, and its canal is obliterated; in other cases there is reason to believe that the vessel completely recovers itself. Mr. Guthrie has a preparation where a ball passed between the femoral artery and vein without dividing either. A large artery, particularly if partially divided by a ball, speedily pours out its contents to a fatal extent; and the numbers who die upon the field from the opening of large arteries far exceed those who survive that accident. Much of the bleeding in all cases depends upon a vessel being cut quite across, and admitting of retraction. If the artery be completely divided, a considerable quantity of blood is quickly lost, and syncope or death arrests the flow. When a limb is carried away, the syncope which frequently supervenes, contributes much to prevent the bleeding; and it has been remarked, that hæmorrhage does not usually return after this spontaneous cessation, unless from impropriety of conduct or accidental violence. In some cases of arteries torn across, one of which has been minutely described and figured by Mr. Lizars, a peculiar corrugation or puckering of the internal coat has been observed, sufficient in the faint and languid state of the circulation succeeding such an injury to obviate the effusion of blood, and naturally leading to a reaction within the extremity of the vessel, accompanied with the effusion of lymph, and the complete and permanent closure of the tube.

In this way we are probably to explain some of those remarkable cases in which limbs have been separated from the trunk, either by large shot or by machinery, without fatal hæmorrhage; and perhaps the same state of the internal coat of an artery, extending to a distance upwards from the wound, will explain another remarkable fact which has been observed, namely, the absence of all bleeding from arteries cut fairly across with the amputating knife in the removal of wounded limbs; of which we have, amongst others, an interesting case recorded by Zinck in the fourth volume of the Recueil des Mémoires de Médecine et Chirurgie Militaire. In some comments upon this case by the editor of the work, he refers to a thesis published at Halle in 1742, by Tschep, entitled *Casus de Amputatione Femoris non cruenta.* In this case the mortification for which the limb was amputated had affected the principal artery a considerable way above the point of amputation. On dressing the stump on the fourth day, the extremity of the artery was seen projecting from the wound, and on drawing it gently, a portion several inches long separated without any hæmorrhage. This case is very much to our present purpose, as it tends to show that, when mortification or sloughing occurs, from whatever cause, the arteries are sometimes involved in it, even to a greater extent than the contiguous parts; and when the slough is not prematurely forced off, the trunks of the vessels which have been injured by a gunshot wound are in general permanently closed before its separation.

On the removal of sloughs, a little blood may occasionally be lost, but it is generally caused by the impatience of the surgeon, or the irregularity of the patient, and seldom requires much attention. Sometimes from about the eighth to the twentieth day, a large artery will give way, but the proportion of cases requiring the ligature of arteries from secondary hæmorrhage is stated by Mr. Guthrie, I believe with great truth, not to exceed three or four in a thousand, exclusive of hæmorrhage from hospital gangrene, inordinate sloughing, or broken bones; and he concludes, "that the opinion that gunshot wounds do not bleed at the moment of infliction, unless a very large artery be cut, and that they generally bleed, and often profusely after suppuration, cannot be too soon banished from the

minds of surgeons, as leading to unnecessary anxiety and bad practice."

But however urgent injuries of the arterial vessels may be, the first danger is generally the greatest, and if this is once obviated, cases most unpromising in their appearance are often conducted to a favourable termination. The case, however, is widely different with gunshot wounds of the extremities complicated with broken bones, and a large proportion of such wounds are cases for the immediate removal of the limb. But before specifying these more particularly, or entering farther into the consideration of gunshot fractures, I would offer a few remarks on those fractures of the limbs occurring from more ordinary causes, premising that it does not fall within my province to consider successively and minutely the fractures of each individual bone, but to confine my remarks to those which, either from the frequency of their occurrence, from their particular bearings on the duties of the soldier, or from questions as to the best mode of treatment, demand particularly the attention of the military surgeon.

Simple fractures may generally be looked upon as accidents devoid of much danger, and their treatment should be particularly successful amongst soldiers, who have for the most part, the advantage of immediate and constant medical attendance from the receipt of the injury to the completion of the cure. Many soldiers, however, are invalided in consequence of imperfect recoveries from fractures of the limbs—a circumstance which has not escaped the notice of the authorities; and the responsibility of a more successful treatment of these accidents is very properly fixed upon medical officers, by the following paragraph of a printed circular letter, issued several years ago, under the signatures of Sir James M'Grigor and Sir William Franklin. "Too much care cannot be taken by medical officers to counteract the measures adopted by designing individuals to render the recovery of an injury incomplete. The 25th and 51st articles of the Warrant, dated 14th November 1829, relative to the discharging of soldiers, confer a power on medical officers adequate, it is hoped, to deter men from protracting their recovery, or from rendering the cure of an injury imperfect. In civil life, persons commonly recover from the effect of fractures and dis-

locations of bones, and there is no good reason why soldiers should not be equally fortunate."

The reunion of a fractured bone is accomplished by a process in some respects analogous to that by which the soft parts are reunited, and it is necessary to observe, that with the successful conduct of this process, in the former as well as in the latter case, a very high or a very low degree of inflammatory action is equally inconsistent. From a knowledge of the first circumstance, an argument has been drawn for deferring the setting, or, as it was formerly termed, the coaptation of a broken bone, until the inflammation supervening after the accident shall have in a great measure subsided. From the latter circumstance, namely, a deficiency of inflammatory action, we have sometimes to deplore the total want of reunion, and the formation of an artificial joint, to remedy which, much ingenuity has been exercised, and various expedients adopted, to which I shall immediately advert.

The whole process of the reunion of a broken bone—the effusion of blood round its extremities, the subsequent swelling and inflammation of the periosteum and surrounding muscles, the effusion of the provisional and permanent callus, the deposition of osseous matter, which, in the cylindrical bones, is found to occupy the medullary cavity contiguous to the fracture, and, finally, the re-opening of this cavity, by the action of the absorbents, are all processes highly deserving attention; but for a more minute account of these I must refer to other sources. I enumerate these different steps only to show that, from the receipt of the injury to the accomplishment of the cure, a series of operations is continually going forward, which may be greatly retarded, or altogether prevented by improper treatment, and which can only be expedited by the due approximation of the fractured portions of bone, by employing the means best adapted to retain them in accurate apposition, and by securing to our patient, as far as circumstances will permit, rest, free air, and wholesome diet.

Fractures are usually divided, with reference to the contiguous soft parts, into simple and compound; with reference to the bones, into transverse, oblique, and comminuted. In cases of compound fracture, when the bone protrudes through the integuments, there can be no difficulty in distinguishing

the nature of the accident; but in simple fractures, when the soft parts remain entire, the diagnosis is sometimes attended with difficulty. This is more particularly the case when they occur close to the joints. The principal diagnostics are pain and inability to use the fractured limb, distortion more or less considerable, and above all, a crepitus or grating of the fractured portions of bone against each other. The two first symptoms, pain and inability of motion, are extremely equivocal, particularly when the fracture is seated close to a joint, for here they are equally characteristic of luxation. The distortion, when the fracture is situated towards the middle of the long cylindrical bones, is often so conspicuous, as at once to mark the nature of the accident; and in bones lying superficially, covered only by the common integuments, as the clavicle and the spine of the tibia, we can often detect a fracture by the eye, or by running our fingers along the course of the bone. Something may also be learned in doubtful cases, from the nature of the cause producing the injury. Thus, as military surgeons, it is well to bear in mind, that many of those accidents to which the soldier is exposed, are not calculated to produce luxation, while they prove common causes of fracture.

In the treatment of fractures, our art has been progressively improved in proportion as it has been simplified; and we are now convinced that the least possible degree of force with which we can reduce a fractured limb, and the most simple contrivance by which we can retain it in a proper position is to be preferred. The first object is often to be accomplished by the hand of the surgeon, without any extraneous aid, and the last may frequently be attained by a piece of pasteboard and a roller. It will readily be understood that both these objects, the setting and retention of a broken bone, are greatly facilitated by attention to the general position of the limb. In some particular cases, as in fractures of the olecranon and of the patella, we have it in our power, by stretching out the limb, to relax the whole of the muscles whose operation can tend to displace the fractured parts; and as a general principle, whenever a particular position of the limb, relaxing the most powerful of its muscles, can be made to co-operate with the best mechanical contrivance for securing a due approximation of the ends of the fractured bone, this unquestionably is the

position which we ought to adopt. But as these two objects are not always attainable at the same time, we must often sacrifice the former to the latter.

We are under great obligations to Mr. Pott for having drawn the attention of the profession to the advantage of relaxing, as far as possible, the most powerful of the muscles operating upon, and tending to displace, a broken bone; for although Mr. Pott's views upon the subject are in some respects erroneous, and not to be realized to their full extent, yet it is obvious that in proportion as we succeed in evading the natural or the spasmodic action of muscles in displacing the broken bone, so will we be able to lessen the constraint of the patient, and to dispense with a powerful coercive apparatus. This ought particularly to be observed in the application of those temporary and often imperfect expedients which we must adopt in securing a fractured limb during the removal of a patient from the field of battle, or landing him from a ship of war.

When any considerable displacement of the fractured extremities of a bone exists, it must prove a source of continued irritation, and where the nature of the accident is distinctly seen, the fracture should be immediately reduced. We know, however, that in as far as regards the formation of callus, and the ultimate reunion of the bone, particularly in gunshot fractures, the cure will not be retarded by the want of immediate coaptation; and where the swelling has rendered the nature of an accident obscure, we may run the risk of aggravating the injury by violent, protracted, or unguarded attempts at reduction.

Fracture of the Clavicle is an accident very common in military as in civil life; its diagnosis is not difficult, and its treatment on the principles so well explained by Desault should be amply successful. But we find many instances of soldiers whose clavicles have been broken, and carelessly treated, constantly complaining that they are incommoded by their belts, or by the straps of their knapsacks pressing upon the prominent part of the bone, and this even to such a degree as to be thought a ground for soliciting their discharge. Cases of this kind will never cease to be a source of vexation to a surgeon when he has to blame himself for any negligence in

their treatment; which it is well known may be successfully conducted by placing a cushion in the axilla, raising the shoulder to a due elevation, and binding the arm down to the side.

Fracture of the neck of the Scapula is an accident of rare occurrence and difficult diagnosis. I have seen five cases in which this accident was believed to exist, marked by a dropping or falling down of the arm, with inability to move it, some degree of flatness under the acromion, and distinct crepitus on alternately elevating and depressing the humerus perpendicularly. The treatment was successfully conducted in all, except the last, of which I did not see the issue, by elevating the elbow, and binding the arm down to the side.

Fractures of the Humerus, in its upper part, and more especially those in what is properly termed the cervix humeri, are often attended with much difficulty in the diagnosis—a difficulty, however, which is naturally greatest when the displacement of the broken fragments is least. In such cases, if we could be contented to let the arm remain bound down to the side for a due length of time, a cure would naturally take place without much surgical aid; but the fear of overlooking a dislocation, with which such accidents are liable to be confounded, often leads to protracted or repeated manipulations, which are anything but conducive to the cure. When displacement occurs, it is naturally influenced by the powerful muscles implanted into this part of the bone; and without going minutely into all the varieties of such accidents, upon which an interesting paper is to be found, by M. Marx, in the "Repertoire d'Anatomie," &c., I shall content myself at present with quoting the following observations from one of my printed Clinical Lectures, suggested by a case of fracture through the neck of the humerus. This I am the more inclined to do because it bears upon a point of practice, the necessity of a cushion in the axilla, which is not always attended to.

In remarking upon that case, I took occasion to point out that when the bone is broken above the insertion of the pectoralis major and latissimus dorsi, these powerful muscles tend to draw the lower fragment of the bone towards the trunk, away from the head of the humerus which remains attached

to the glenoid cavity of the scapula. When the fracture, again, passes through that part of the bone into which the two last mentioned muscles are inserted, both fragments are naturally drawn towards the trunk; and when the fracture is immediately below the insertion of these muscles, it is the superior fragment of the bone which is drawn by them towards the trunk of the body, while the lower fragment is drawn outwards and upwards by the deltoid. These are not to be considered as the only muscles tending to displace the broken fragments of the bone, but they are by far the most powerful; and by leaving the others out of view for a moment, we are, I think, better enabled to understand the position which the broken ends of the bone generally assume in fractures of the upper part of the humerus; and we will readily perceive in treating them the propriety of placing, along with the splints on the outside of the arm, a pad or cushion in the axilla, so as to operate on one, or other, or both fragments of the bone, as the case may require.

Fractures of the neck of the Thigh-bone, although chiefly incident to people in advanced life, beyond the age of military service, are nevertheless occasionally met with amongst the various accidents to which soldiers and seamen are liable. This fracture, like that of the neck of the humerus, is in some rare cases accompanied with so little displacement, that I have in one instance known a patient to walk after a fracture of the neck of the thigh-bone; and from a memoir of Sabatier's it will be seen that the same thing has been observed by others. But the common consequences of a fracture of the neck of the thigh-bone are complete lameness and shortening of the limb, with eversion of the toes. The space between the trochanter and crest of the ilium is diminished. On drawing down and rolling the limb a crepitus is sometimes perceptible; and the trochanter may be observed to move along with the shaft of the bone. The attention of the profession has of late been much directed to fractures of the neck of the femur, to the possibility of procuring a bony reunion when the fracture is within the capsular ligament, and to the circumstances which may favour or counteract such reunion. But without going into this controversy, I may observe that I have not yet seen any unequivocal instance of a bony reunion where the fracture

was wholly within the capsule, and the head of the bone fairly detached; and I am necessarily led to agree with Sir Astley Cooper in questioning, not the possibility, but the probability of a bony reunion under such circumstances. On the other hand, I am induced, from my own experience, to admit the difficulty of ascertaining precisely whether a fracture of the neck of the femur is wholly or only in part within the capsule; and I concur with Mr. Earle in believing, that painful and protracted efforts to ascertain this point may prove not only futile, but ultimately injurious, by lacerating the investing membrane of the neck of the bone, and impeding its reunion, "thus contributing to make good our opinions by our practice."

In the treatment of this accident, I presume that every surgeon is desirous of taking steps to procure the most perfect reunion of which the case admits; and I believe that the perfection of this reunion often depends upon circumstances which it is nearly or altogether impossible to ascertain with precision—nay, upon circumstances which may be altered for the worse by the very attempt at such precision. I would therefore recommend in every case to take the chance of obtaining a bony reunion by adopting that mode of treatment most likely to procure it; for, however imperfect this union may ultimately prove, it will always be a pleasant reflection to think that nothing has been omitted which was calculated to promote it, and that nothing has been done which could possibly impede it.

It would ill become me to underrate the importance of the discussion about fractures of the neck of the thigh-bone, considering the distinguished surgeons who have taken part in it; but while some points connected with this controversy are still undecided, I must, *pendente lite*, be permitted to solicit attention to a division of fractures of the upper part of the thigh-bone capable of immediate practical application. I would divide these fractures into such as occur in that part of the bone above the muscular insertions, and such as occur at, or immediately below, the point where these muscular insertions commence—that is, into fractures above the trochanters; fractures passing through these processes; and fractures immediately below them—of each of which there are numerous varieties.

In the first case, it is obvious that we have no command over the head and neck of the bone, except through the medium of its ligamentous connections with the pelvis, and every contrivance calculated to insure the successful treatment of this accident must have in view the fixture of the pelvis as well as of the thigh-bone. The limb may be placed either in the bent or extended posture; but perhaps the former is the best wherever we have an apparatus sufficiently perfect for keeping the parts in apposition.

In the second case, that of fracture through the trochanters, we have both portions of the bone acted upon, and sometimes rotated in opposite directions by the muscles implanted into them; and hence we are enabled to explain the fracture of this part of the bone, with inversion of the toes—an occurrence which was long ago noticed by Paré and Petit, but of which the true explanation has only recently been given by Mr. Guthrie of London, and Mr. Syme of this city, each of whom has met with an instance of this variety. Of its treatment I speak with great diffidence, because I speak without any personal experience; but I am disposed to think that in most cases the tendency of the limb to deviate from the natural position will be best counteracted by keeping it in the extended posture by a common long splint, or by means of Boyer's, Desault's, or Hagedorn's apparatus, the last little known in this country, but which I saw in use in the great hospital at Hamburgh several years ago, and which I have upon one occasion successfully employed in the hospital here.

In the third case, that of fracture immediately below the trochanters, the limb ought, in my opinion, to be placed in the bent position. It has been observed, that in this instance no modification of the extended posture will answer well; for, supposing the patient placed on his back, the powerful action of the psoas magnus and iliacus internus muscles, inserted into the trochanter minor, will raise or bend the upper fragment of the bone upon the pelvis, while it is obvious that all attempts to extend, to level, or to depress the inferior fragment of the bone will tend to separate the broken ends from each other. I would therefore press upon the surgeon's attention these three varieties of this accident, as more capable of being recognised in practice, and better calculated to lead to

a determinate and successful mode of treatment. In the first case the position of the limb may be optional; in the second I consider the extended posture the best; and in the third the bent position should, I think, be adopted.

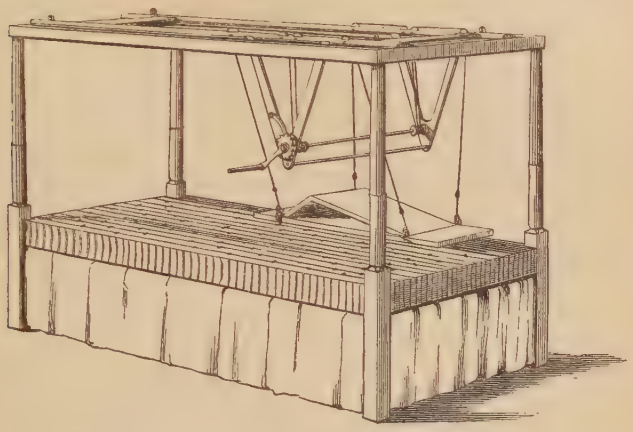
It is chiefly in reference to fractures of the thigh-bone that the question of relaxing the muscles has been considered of paramount importance, and the different view of this subject adopted by the English and by the French surgeons, was followed for a series of years by a very marked difference in their practice—the former adopting the bent position, and the latter the extended. Of late, however, I believe that the surgeons of both countries are disposed to take a less exclusive view of this matter; and my own experience tells me that in the infinite variety of fractures which one has occasion to see in the course of a long run of hospital practice, he will find that a fractured limb sometimes lies best in one position, sometimes in another, without his being always able to see distinctly the reason why. An early bias, derived perhaps from the study of Mr. Pott's writings, and the observation that the limbs naturally fall into the bent position during sleep, have made me partial to this position in the treatment of fractures of the lower extremities. I am not, however, insensible to the objections to Pott's position, and the extended posture is unquestionably the favourite mode of treatment with many of the best surgeons in this country at the present day.

There is one important consideration by which I have often been guided, and which army and navy surgeons, above all others, must never lose sight of. In military practice we are not always able to have recourse to the measures we may think positively best, but must resort to those which, under all the circumstances of the case, we can command most readily and use most effectually. This applies particularly to fractures of the femur, for although we may not always be able to command the finished apparatus of Desault, Boyer, or Hagedorn, we can seldom be at a loss for a long splint upon which to extend the fractured limb; and, even in defect of this, we may be able to keep up a continued extension by fixing the patient's trunk, and then applying a lac or the strap of a tourniquet, so as to draw down the fractured limb towards the bed-post, or to a fixed point in the floor, as sug-

gested by my predecessor Dr. Thomson. There is also a mode of effecting this object by means of a weight attached to a cord which is fixed to the patient's ankle, and passes over a pulley at the foot of the bedstead. Independently of the facility with which an apparatus for the extended posture of the limb may always be procured, it is to be observed—with reference to gunshot fractures particularly—that where extensive, profuse, and long continued suppurations must necessarily ensue, the patient, if placed on his back, with the limb over a double inclined plane, will have the thigh in such a position that the matter will gravitate towards the pelvis, will tend to lodge, to impede the cure, and perhaps to extend the mischief.

For the treatment of broken limbs in the bent position, all the common pieces of apparatus are modifications of the double inclined plane, and of these Mr. Earle's, Mr. Amesbury's, and Mr. M'Intyre's, are the best with which I am acquainted. The last, upon which some improvements were made by Mr. Liston, I have now been in the habit of using for years with satisfaction and success. The practice of swinging or suspending fractured legs in a sort of cradle, is one which I have repeatedly seen in several of the Continental hospitals, and more recently in the hospitals of this country. I am inclined to think that this might be extended with advantage to many cases occurring in military life. Such an apparatus suspended within one of the doolies or litters used in the Indian army would afford great comfort to a soldier compelled to travel with a broken leg. The following woodcut represents the model of a suspensory apparatus which was presented to me nearly thirty years ago by Mr. Young, formerly a surgeon of eminence in the city of London, whose name is mentioned respectfully in Sir Astley Cooper's writings. It was, I think, the invention of one of the surgeons of the Canterbury Hospital, and is adapted to fractures either of the thigh or leg. It consists essentially of the old double-inclined plane—for which one of Liston's splints might be advantageously substituted—and is capable of being raised by means of a rack and pinion, to any desirable elevation. I am in possession of some other neat and ingenious pieces of apparatus for the suspension of fractured limbs, but it would be foreign to my present purpose

to enter into any detailed description of them here; and although in the habit of showing them in my class, as well as many other



contrivances and ingenious surgical instruments, I do so rather for the purpose of pointing out the objects aimed at in their construction, and teaching my pupils to devise substitutes for them, than from any expectation that they can in general be furnished with an apparatus in any degree complicated. I have lately been furnished with an excellent set of splints by Mr. Tuffnell. These may be formed of strong wheaten straw, formerly in use, and for the most part easily procured. This is encased in flat linen or canvas bags of different lengths, adapted to the length of the bones of the superior and inferior extremities. "The advantages of these splints," says Mr. Tufnell, "are lightness, durability, and absence of all padding—they being splint and pad in one. All lotions evaporate through the straw; any projecting processes of bone (as the malleoli), are provided for at once by sinking the point of the finger in between, and separating the straw, so as to make a bed for them. They bind completely round the limb, so that they cannot shift as square splints do, especially on the upper arm."

In compound fractures, at least in those occurring from the common accidents of civil life, it may be observed that in making its way to the surface through the different strata of muscles, some of the fibres must be divided transversely, while

others are merely separated longitudinally, by the protruding bone, and in relaxing the wounded muscle we approximate the extremities of those fibres which have been cut across, while we in no degree tend to increase the displacement of those which have been merely separated from each other longitudinally; and in cases of this kind we have an additional argument in favour of relaxing the wounded muscle, which is not always duly adverted to. In compound fractures the first object of attention after the reduction of the fracture is the closure of the external wound—a practice recommended by all the systematic writers, and which is attempted by various modes of dressing; sometimes by a pledget of lint soaked in blood, and allowed to form an incrustation over it; sometimes by covering it with a paste of gum or albuminous matter; and sometimes by bringing the lips of the wound into accurate apposition with adhesive straps or sutures. But whichever of these modes may be adopted, I regret to say that the object in view is very frequently frustrated by excessive inflammatory action, running on to suppuration or gangrene. The practice of enveloping fractured limbs in splints and bandages, without undoing them for weeks together, is akin to that followed by the natives of India, of inclosing fractured limbs in moulds of clay. Of the successful result of this practice I remember a remarkable instance in the case of a little boy who was brought into my tent one morning, having been run over by a waggon on the line of march, and having sustained a severe compound fracture of the leg. I was preparing to amputate this boy's limb, when his parents came in and carried him away to the potter in an adjoining village, who enveloped the leg in clay, and I believe finally cured the patient.

From the result of this case, and of others similarly treated, I was naturally prepossessed in favour of the practice adopted during the Egyptian campaign, and strongly advocated by Baron Larrey, of dressing fractures, both simple and compound, with compresses and cushions of straw, leaving them undisturbed till the completion of the cure. And I remember to have met with an hospital surgeon so much enamoured of this practice, that he said he never expected to lose another case of compound fracture after its adoption. I fear, however,

he will have learned by this time, as I have done, that no exclusive practice of this kind is uniformly applicable, and that it is not easy to discriminate *a priori* between those cases in which the above practice will be advantageous, and those in which it will prove not only injurious, but absolutely insufferable. An account of Baron Larrey's treatment of fractures, "par l'appareil inamovible," was transmitted to me several years ago by M. Hippolyte Larrey, the son of my distinguished friend the Baron. His Thesis on this subject contains many interesting remarks on fractures generally, and much valuable information relative to his father's plan of treatment. Some useful modifications of the immovable apparatus have lately been introduced, and are extensively employed on the Continent, particularly the use of slips of thick paper in the form of a many-tailed bandage, or of soft pasteboard, secured by a cloth roller moistened at each successive turn with starch or paste, and allowed to dry on the limb. The latter, it may easily be supposed, will speedily form a most perfect and secure encasement.

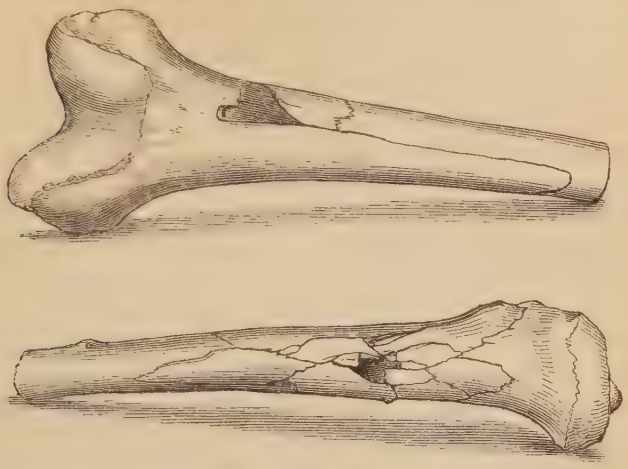
I had an opportunity, about ten years ago, of seeing this plan executed with great address by one of its most distinguished advocates, M. Suetin of Brussels, where it was then uniformly practised; but I saw also in this gentleman's hands a little patient, three or four years old, with a fractured thigh, where the apparatus, having been put on the preceding evening, immediately after the accident, had become too tight, and was obliged to be slit open with M. Suetin's scissors. In another case of fractured thigh, the apparatus, which had become slackened from the subsidence of the swelling, was slit open, a portion of it removed by paring off one of the edges of the slit, so as to adapt it accurately to the diminished size of the limb, and was then replaced with the starched bandage over it. This mode of dressing fractures was so much approved of by the Russian authorities, that their army and navy surgeons were at one time ordered to adopt the starched bandage. In my opinion, however, none of these practices should be looked to as preventative measures, or used indiscriminately. In many cases they had better be deferred until it is seen whether the injury is likely to be accompanied with any excess of inflammation; and I am farther of opinion, that upon

the Continent, where the habits of the people are comparatively temperate, and still more amongst the natives of India, all these practices will be found more generally satisfactory and successful than amongst our hospital patients in this country, many of whom are so much given to the abuse of intoxicating liquors.

Inflammation, swelling, tension, and spasms, are the well known consequences which we have chiefly to guard against in the treatment of compound fractures in their earlier stages, and in proportion as we succeed in keeping these within proper bounds, by blood-letting, abstemious diet, cold lotions, fomentations, &c., in the same proportion shall we succeed in shortening the inflammatory stage, preventing or diminishing the subsequent suppuration, accelerating the process of reunion, lessening the time of our patient's confinement, and thus saving his constitution. It should be recollected, however, that under the best treatment the cure of compound fractures is necessarily a tedious process; and hence blood-letting should be used with great, perhaps with more than usual caution. And while I am disposed to question the propriety of an indiscriminate adherence to one mode of treatment, there are some points in the management of compound fractures on which my own observation has led me to form a very decided opinion. I have too frequently seen a reluctance to use the saw in removing the protruding extremities of the bone, when these were either difficult to reduce, or of a sharp and spicular form; and I have sometimes seen the closure of the external wound attempted by means too forcible, and too long continued. In short, I have seen here, as well as in other cases, much mischief done by obstinately resisting the termination or mode of cure to which nature obviously points.

In gunshot fractures one of the most characteristic features is the extensive comminution and splintering of the bone with which they are attended, and of which I here give an example out of many similar ones to be seen in the museum. Here also, in the first of these figures, is an example of the splitting or longitudinal fracture of a bone—an occurrence, the possibility of which became at one time a subject of discussion in the French Academy of Surgery, and the existence of which

was first demonstrated to the satisfaction of that body by Leveillé, in the tibia of an Austrian soldier. It is remarkable in



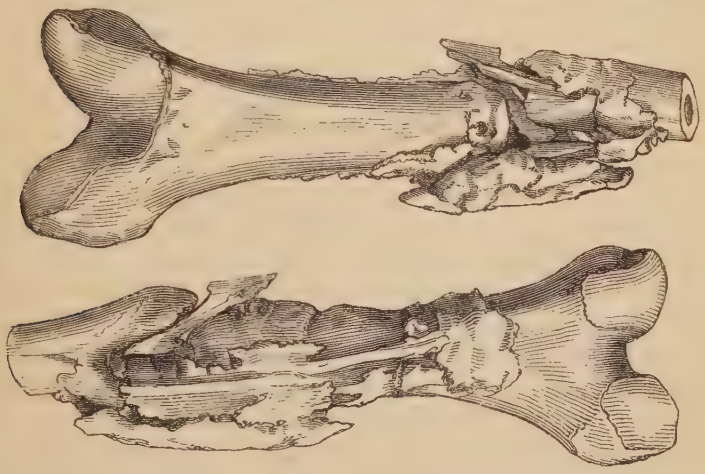
both these preparations, that as in passing through the soft parts, a ball generally leaves an aperture more rugged and extensive at its exit than its entrance, so in these two cases the comminution is greatest, and the longitudinal fissure most extensive at the point where the ball has made its exit from the bone. This longitudinal fissure, of which there are numerous examples in my collection, and which, in the present case, extends nearly six inches upwards from the site of the wound, is so common an occurrence, that it is right to estimate for it in determining on the point of amputation in gunshot fractures.

When such fractures occur towards the middle of a bone, particularly in the superior extremity, and when the comminution is not great, the soft parts not much contused, and the patient likely to be speedily placed in circumstances favourable to his recovery, an attempt is to be made to save the limb. After having extracted the ball or other extraneous substances which may have lodged, and having also removed any detached splinters or projecting spiculæ of bone, the wound is to be covered with a pledget of lint; the limb placed in a position calculated to relax as far as possible the injured muscles; and if the patient is to be moved, it should be surrounded with such splints as it may be possible to pro-

cure, more, however, with a view of securing it from additional violence during the transportation to the rear than with a view to its speedy reunion. Whenever a ball has become imbedded in the substance of a bone, no effort should be spared to effect its removal. Mr. Guthrie's extensive experience has led him to express himself very strongly on this point; and Sir Charles Bell's account of the sufferings of the Russian General, Baron Driesen, will afford a striking example of the miseries often entailed upon patients by balls lodged in bones. A case in which I was consulted about twenty years ago, affords if possible a still stronger proof of the extent and duration of suffering from this cause. An officer wounded in April 1813, had retained from that time a musket ball in the upper part of the tibia, a source of almost continued distress, and repeated febrile attacks, by which his constitution was so much impaired, that although the extraction of the ball was successfully accomplished, the fever supervening upon the operation assumed a typhoid character, and carried him off rapidly.

In further illustration of the propriety of at once removing balls when lodged in bones—a point which I have always strongly urged upon my pupils—I would refer to the following specimens in my collection:—Amongst numerous balls which have been imbedded in the bodies of different individuals, B No. 112 is a ball lodged in the head of the tibia of a soldier of the Royals for thirty-four years, and extracted at the end of that time by Dr. Guthrie, a surgeon at Brechin, in Forfarshire. B No. 130, is a ball which was lodged for forty-eight years in the tibia of Alexander Gunn, a soldier of the 75th regiment. The ball was received in action near Amedabad in the East Indies, 3d April 1802, and was extracted in the Royal Infirmary of Edinburgh 13th June 1850, by my colleague Mr. Syme, to whom I am indebted for the ball. It is impossible to conceive a case more illustrative of the imperious necessity of immediately removing balls than this last mentioned. Here an old soldier, far advanced in life, comes up to the hospital, after the lapse of almost half a century, to have a ball removed which had been his companion all that time, and had been the cause of occasional, if not continued anxiety and distress.

The dead portions of bone frequently existing in gunshot fractures must come away by exfoliation, and having often to make their way through callus, or newly formed bone, with which they become surrounded, the process of their complete detachment and final expulsion sometimes occupies months, or even years. Of the vigorous efforts of nature to restore breaches in the long bones from gunshot fractures, many beautiful and interesting examples are to be seen in the museum attached to the class of military surgery in this University, and of these, as regards the thigh bone, one of the most



remarkable is represented in the preceding woodcut; and while it affords a striking instance of the elaborate nature of the reproductive process, it affords also an instance of its ultimate failure, for here the surgeon was obliged to resort to amputation on the 153d day, or five months after the receipt of the wound. In the museum, A No. 80, is to be seen a case of comminuted gunshot fracture of the radius with a ball lodged between the radius and ulna, so completely encased in a capsule of ossific matter thrown out around it, that one would suppose it might have lain with impunity, but here it became necessary to amputate the forearm on the 223d day after the receipt of the injury.

In the treatment of gunshot fractures, our principal care must be to subdue or control the inflammatory symptoms by

general and local antiphlogistic measures; and it is only when these inflammatory symptoms have subsided, and reunion about to take place, that it becomes an important object to secure an accurate coaptation, by means of a particular position of the limb, splints, and bandages. In fractures of the thigh, whatever advantages we may afterwards expect from the extended position of the limb, it may often, in the first instance, be advantageously placed in the semi-bent position without splints or bandage. Indeed, whatever diversity of opinion exists amongst surgeons with regard to the position of the limb in simple fractures, the propriety of relaxing as far as possible the injured muscles in the early stages of compound, and particularly of gunshot fractures, is in my opinion obvious. This, however, is not easily attainable in some of those injuries to which I am now more particularly adverting; for when a ball or other missile passes through a limb, it may wound those muscles which naturally antagonise each other. In this case the relaxation of one set of muscles implies the tension of another, and an intermediate position or state of semi-flexion, is that which, upon the whole, offers perhaps the greatest advantage.

With reference to gunshot fractures of the lower extremity, and particularly of the femur, the question as to the position of the limb is perhaps, after all, one of secondary importance. I have indeed seen a few instances of serviceable, although deformed, limbs after gunshot fractures of the thigh, but I have long been impressed with the generally unfavourable result of such injuries. I had recently under my observation a field-officer in the army, who sustained a fracture of the thigh-bone from a large shot so far back as the battle of the Pyrenees in April 1813, and who, from that day forwards, continued to suffer more or less from a necrosed state of the femur, from which a sequestrum was removed by Mr. Syme in the summer of 1845. In Mr. Guthrie's writings we have a most interesting account of the gunshot fractures of the thigh occurring at the battle of Toulouse, and although—this being the concluding engagement of the war—they were treated with extreme attention, and with all the accumulated experience of former actions, and although some of the cases, where the fracture was at, or below the middle third of the

thigh, were considered successful, the results are not, upon the whole, to be looked upon as giving much encouragement to the preservation of limbs where the femur is shattered by gunshot. Much, very much, depends upon the extent of comminution of the bone, and the injury done to the soft parts. When immediate amputation is had recourse to in such cases, where, perhaps, the patient has lost but little blood from the wound,—and it may be less from the operation,—I have often thought that his chances of recovery might be improved by one or more free bleedings, following out the idea of Baudens, where, in speaking of his first departure from the old practice of scarification, or "debridement," in gunshot wounds, he bled his patient "pour ne pas laisser trop d'éléments à la fièvre traumatique." I cannot pretend to say what may be the inferences to be drawn from the results of the present campaign in the Crimea, but the experience of some of the surgeons would seem to be more favourable than mine to the attempt at preserving thighs fractured by gunshot. Dr. Dumbreck, in a letter to me, says, "However high up the femur is fractured by a musket ball, if the fracture is exterior to its capsule, I would try and save the limb, without thinking of removing it at the joint, or just below it. I know cases of recovery from this injury without amputation. Shortening of the limb follows; but this is a trifle. None of the cases of amputation of the hip-joint, or very high up, recovered. I have a most painful recollection of one of those, where, I think, if we had left the brave and healthy youth untouched, he might have been alive now."

The following abstract of the opinions of the most experienced surgeons, translated from Velpeau's very useful work on operative surgery, tends to shew that there are comparatively few cases of gunshot fracture of the femur in which an attempt to save the limb is either wise or warrantable.

"It is not in the neighbourhood of complicated articulations only that gunshot wounds, with fracture and lesion of the synovial cavities, are accompanied with danger. These wounds are not less formidable when they occur in the middle of the long bones, more especially those of the lower extremity. Thus, when a ball produces a comminuted fracture both of the tibia and fibula, while at the same time the soft parts are

bruised or violently contused, amputation is almost always the inevitable consequence. When this operation is not performed, we find that for one recovery, there are at least ten deaths. In the case of the femur, the indication is still more explicit and distinct. Ravaton says that if amputation is not had recourse to, gunshot fracture of this bone is nearly in all cases attended with fatal results. Schmuker maintains that only one in seven thus wounded is saved. Lombard expresses himself in a similar manner. M. Ribes, who has only seen one cure, gives the history of ten cases, where, notwithstanding the utmost care and attention, the patients sunk; and he also mentions, that at the *Hotel des Invalides*, out of four thousand individuals who had suffered from wounds of this sort, he could only find one successful case. M. Yvan mentions two cases of cure effected in 1815, in which, however, the patients afterwards fell a sacrifice to fistulous sores consequent upon the fracture. M. Gaulthier de Claubry, an old surgeon of the imperial guard, holds the same opinion on this point as M. Ribes, and informs us, that in the Spanish army almost all the soldiers who had their thigh-bones fractured died unless amputation had been practised immediately. Out of eight cases treated by Mr. S. Cooper, after the battle of Oudenbosch, only one survived, and the limb in this instance was of very little use to the individual. Percy, Thomson, Larrey, Guthrie, and Hennen have made similar observations; and the events of July 1830 have also led most of the surgeons attached to the Parisian hospitals to adopt the same conclusions. One of the individuals, however, who was wounded in this manner, was treated with success by M. Lisfranc, at La Pitié, a second was saved by M. Dupuytren, and three other cures are mentioned by M. Arnal. I have not been so fortunate in my practice. Only one case was admitted into my wards. The fracture appeared to be very simple, and nevertheless, no treatment was of any avail, and death put an end to the patient's sufferings on the thirty-eighth day. M. Sommé cured two out of eight without amputation, during the events at Antwerp in October 1830. M. Lassis and other practitioners, both at Paris and Brussels, have published also some successful cases. We must not, however, forget that both in France and in Belgium the wounded were placed in the best possible circumstances, and were treated in the same

manner as the sick in civil practice, whilst in the army and in military hospitals, they must necessarily have been deprived of much of that care which is bestowed upon them in private life."

In former times the period required for the consolidation of different fractures was specified with great precision; from thirty to thirty-five days were allowed for the bones of the upper extremity, and from forty to fifty for those of the thigh and leg. We are now, however, too well acquainted with those circumstances which may either promote or retard this reunion, to affect much accuracy on this subject. A bone will, *cæteris paribus*, reunite sooner in proportion as it is young and vascular, and its reunion will be impeded by advanced life, an unsound constitution, or a want of perfect retention. Indeed, as I have formerly hinted, these circumstances may altogether prevent its reuniting, and an artificial joint may be formed, although, from Mr. Amesbury's observations, there is reason to believe, that when the constitution is sound, this unfortunate occurrence may very generally be obviated, even at a late period, under the judicious employment of local pressure and rest, without any other expedient whatever.

For the cure of false joints, the most simple and the most ancient expedient is that of rubbing the fractured portions of the bone against each other, with the view of exciting an inflammatory action—a practice distinctly recommended by Celsus. With the same view it has been recommended, in ununited fractures of the lower extremities, that the patient should be made to walk with his leg enclosed in a case formed of stiff leather or strong pasteboard, and this is a practice which I have resorted to with success in two such cases. Another plan of treatment calculated to excite a salutary action in the broken ends of the bone, is the passage of a seton through the fractured part of the limb. This was first employed by Dr. Physic of Philadelphia, and having succeeded in his hands in the case of a fractured humerus, it was shortly afterwards attempted by Mr. Wardrop of London, in the case of Captain Hay of the Astell, East Indiaman, in whom a fracture of the femur had remained ununited for a considerable period. In this case, however, after much perseverance on the part of the surgeon, and much suffering on the

part of the patient, the bone remained ununited, and the operation has since been repeated by different surgeons with various degrees of success.

The expedient of cutting down upon the fractured extremities of a bone, and removing a portion of them with the saw when they have remained long ununited, was first resorted to by an excellent surgeon, the late Mr. White of Manchester, in a case of fractured humerus. The same operation was performed by Mr. Rowland of Chester, in the case of a fractured thigh-bone; but although he succeeded in his object, Mr. Rowland hesitates to recommend a repetition of the operation. Upon the whole, the flattering hopes formed from the success of this operation at first have been in a great measure blasted by its repeated failure; and indeed unless the want of reunion is obviously the result of some maltreatment or sinister accident in the first instance which can be sufficiently guarded against on a second attempt, we have no great encouragement to undertake it. A case was shown to me within these few days by my colleague Mr. Spence, in which he adopted successfully a modification of this operation. The bone was only partially sawn through, and the section then completed with the cutting pliers. "This," says Mr. Spence, "requires less turning out of the bone, and consequently less denudation and separation from the surrounding parts, while the section with the pliers more closely approaches a fracture than the action of the saw." Some cases of ununited fractures have lately been treated by Dieffenbach and others, by means of ivory pegs introduced into the fractured extremities of the bone, by a small gouge or drill, or by a common gimblet, and allowed to remain for several weeks, until ossific union is commenced or established. Subcutaneous incision by a strong broad pointed knife carried down between the ununited extremities of the bone, so as to divide very freely, and break up the intermediate structures, has been resorted to; and in cases of gunshot or severe comminuted fractures, it is to be borne in mind that a fragment of necrosed bone has impeded the re-union, on the removal of which the cure has been speedily accomplished. Where non-union has, in the first instance, been the consequence of any constitutional defect, we have no good ground to expect suc-

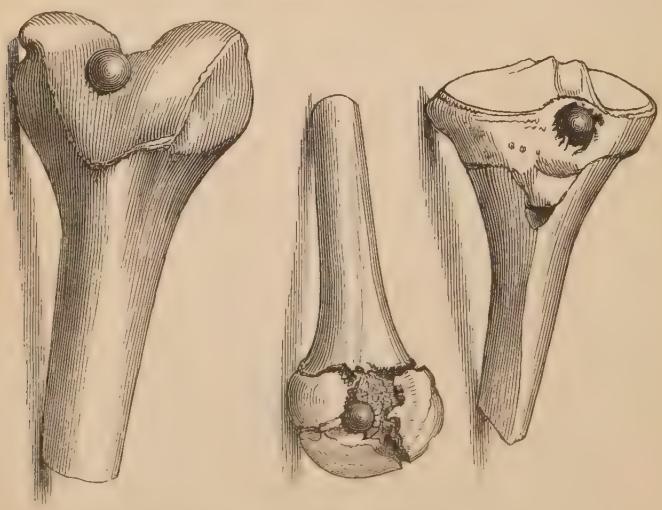
cess from any operation; for it cannot be supposed that health, originally defective, will be improved under the confinement and restraint which an attempt to cure a broken bone necessarily implies. With reference to the cases of soldiers and seamen more particularly, we must advert to the occasional prevalence of scurvy amongst them, which proves one of the most formidable, and frequently irremediable causes of non-union. A striking example of this is given by Baron Larrey in the number of false joints occurring amongst the French soldiers in Syria after gunshot fractures. This he ascribes to the continual movement of the wounded soldiers, to the malarious atmosphere of Syria, and to the insufficiency and bad quality of their food.

The opening of joints, or fracturing the articular extremities of bones forming them, constitutes one of the most severe classes of injuries we meet with in wounds of the limbs—a class of injuries, I may observe, eminently uncertain in their results, these being sometimes more satisfactory than the most sanguine or inexperienced could anticipate. In other cases, after severe and protracted suffering, they terminate so unsatisfactorily as to occasion lasting regret at not having at once amputated the limb. In deciding upon this important step, the extent of the wound, its proximity to large blood-vessels, the more simple or complicated structure of the joint, the comparative injury done to the bones forming the articulation, the constitution and habits of the individual, and the accommodation to be procured for him, are all circumstances to be maturely weighed.

Looking to the size and situation of the joint, I may observe generally, that it is with reference to the hip-joint of which injuries are comparatively rare, and with reference to the knee-joint, in which they are frequent, that the grave question of primary amputation or excision becomes particularly important. These are cases in which the system must inevitably sympathise to a great extent with the local injury. They are cases in which both the injury and the operation, whether primary or secondary, involve to a great degree the life of the patient. With regard to the other joints, I may observe that unless the injury is such as obviously to destroy the future utility of the joint, or of the limb, the question of

amputation is less urgent. The removal of the arm, even at the shoulder-joint, is an operation, as we shall afterwards see, most remarkably successful, and the amputation of the inferior or smaller joints can scarcely be said seriously to involve the life of the patient.

With reference, again, to the kind of wounds, the mere opening of the capsule by a ball or other missile, or by a sabre wound, is not a case demanding primary operation. This remark may also be extended generally to those cases in which there is a mere fissure of the articular extremity of a bone from the contact or lodgment of a ball contiguous to the joint, without displacement of fragments. Cases again which call for prompt decision and immediate operations, of one kind or another, are those in which there is comminution of the articular extremities of one or all the bones forming an articulation, with displacement of the fragments; cases in which there may be an extensive destruction of the cartilages or internal ligaments of a joint by a ball passing through it; or those in which a foreign body has lodged in the joint, whether lying loose within the capsular ligament, imbedded in the extremity of one of the bones, or projecting prominently into



the joint from one of the articular surfaces, as is to be seen in some of the preparations in the museum of the class. When-

ever the attempt to save a wounded joint is determined on, the most essential points in the treatment are to subdue excessive inflammation by local bleeding and the usual applications, to facilitate the escape of matter when it forms, and to keep the wounded joint in a state of rest.

In the treatment of gunshot wounds generally, and in wounds of the joints more particularly, many circumstances have concurred lately to impress me with a very high opinion of the beneficial effects of large and repeated leeching. I allude particularly to several cases of gunshot wounds, in the treatment of which I have been concerned since the conclusion of the last war—cases in which there was full time for observation and reflection, and cases in which there was ample facility in procuring the necessary supply of leeches. I allude also to the following results of wounds of the joints after the battle of Waterloo. From a return furnished to me by my distinguished predecessor Dr. Thomson, and signed by Dr. Wray, of "Joint cases treated in the St. Elizabeth Hospital at Brussels, from 20th June to 5th August 1815," including wounds of the shoulder, elbow, and wrist, of the hip, knee, and ankle, it appears that there were in all 78 cases admitted—of which 14 required amputation, 10 died, and 54 remained under treatment. Of these 49 were reported doing well, and 5—all of the knee-joint—returned doubtful. On pointing Dr. Thomson's attention to this return, and seeking the explanation of results more satisfactory than I was prepared to expect, he told me that he considered it, as far as the treatment was concerned, owing to the free and repeated application of leeches.

In the 23d volume of the "Medico-Chirurgical Transactions" will be found a paper of Mr. Alcock's, containing some interesting statistical information, and many valuable remarks on the surgery of wounded joints. He notices particularly the benefit often derived from a more tonic and stimulating mode of dressing, when a puffy, swelled, and unhealthy state of the joint has been induced by the injudicious or long continued use of poultices. Dressings of this nature, consisting of decoctions of aromatic herbs, with the addition of a little wine, are freely employed by many of the continental surgeons with the happiest effects, as a substitute for poultices,

to which I have often thought that there is too great a partiality in this country, and by which the engorgement or infiltration of the limb appears to be fostered.

The cavities of the joints of the upper extremity, even the shoulder-joint, is occasionally laid open by a stroke of the sabre; and when the constitution is sound, and circumstances otherwise favourable, the wound ought immediately to be closed, and by proper attention to the after-treatment, recovery sometimes takes place with little constitutional disturbance. Injuries of this joint from musket or grape-shot are often a sufficient ground for the removal of the arm at its articulation with the scapula, or more frequently for the excision of the head of the humerus. The propriety of this operation as applicable to cases of caries of the joint, occurring in civil life, is well illustrated in Mr. Syme's valuable work on excision of the joints; and its utility in wounds of the shoulder-joint is fully established by several cases, of some of which the details are to be found in the writings of Mr. Guthrie, Mr. Morel, and others.

This operation has been no less successful in the French army, in the hands of Baron Larrey, who observes, "it sometimes happens that a ball fired at a short distance strikes the humerus immediately below its head, and breaks it short off; and the pressure of the detached head of the bone, acting as a foreign body, causes irritation and inflammation of the joint. Abscesses, sinuses, and caries soon become evident, and there is no resource but in amputation. "I have," adds the Baron, "had the good fortune, in ten cases, to prevent this unfortunate result, by extracting either the head of the humerus or its fragments without delay." After a detail of his mode of performing the operation, by an incision through the deltoid muscle, parallel to its fibres, and along the course of the bone, he states the result of his cases as follows:—"One died of fever, and two of scurvy at Alexandria; one of the plague after the return of the army from Syria, and the others were sent to France cured." So long ago as 1794, Baron Percy is said to have shown in the Parisian metropolis no less than nine cases of the successful performance of this operation. I have now seen this operation executed five times in consequence of a carious state of the joint; two of these patients

have died, one of them from incurable internal disease; the other three have obtained cures, and have obtained a limb more or less useful. In short, the results have been such as to satisfy me perfectly of the applicability of this operation to military practice.

In wounds of the elbow-joint, we have no experience in military practice of the immediate excision of the articular extremities of the bones; but I had an account of a case transmitted to me by the late Mr. M'Intyre of Newcastle, where this operation was successfully executed. The case was one of severe compound fracture of the joint, and the patient recovered so far "as to manage a steam-engine, and to use his arm with considerable strength." Another case of primary excision was mentioned to me by Mr. Cross of Norwich, as promising a satisfactory result when he saw the patient at Liverpool. I have now had the good fortune to witness more than fifty cases in which the elbow-joint has been either wholly or partially excised for caries. In most of these cases, the operation was performed by Mr. Syme, who, within these few days, told me that he has now performed this operation more than a hundred times. In three cases I have seen this operation executed by Mr. Liston, in one by Dr. Simpson, in two by Mr. Fergusson, in one by Mr. Lizars, in one by M. Roux at Paris, and in one case I performed the operation myself; and from the results of these, I am satisfied that in many cases of gunshot fractures of the elbow-joint, the operation of excision may be successfully and advantageously performed.

The hazardous character of wounds involving the hip-joint is well known to every experienced surgeon, and the removal of the thigh at the hip-joint, recommended for some of these wounds, is an operation which one can never undertake but with reluctance. The experience which we have of the excision of the head of the femur, in cases of caries, is now considerable, and appears to me to be encouraging; and since I have become familiar with the excision of other joints, I have frequently reflected upon the possibility of substituting the operation of excision for that of amputation at the hip-joint, in some of those cases of gunshot wounds where the latter has been recommended. I am now encouraged to speak with more

confidence on this point, from finding the operation advocated by Mr. Guthrie, one of the first authorities in military surgery. That the operation may be performed with facility, I make no doubt. Without being aware of my friend's sentiments on this subject, I was in the habit of showing in my class, for a number of years, that by a perpendicular incision along the bone on the outside of the joint, and another crossing it at right angles, the head of the femur may be excised, even when the head and neck of the bone are not previously broken or comminuted. When this is the case, the operation would of course be greatly facilitated, and would probably be most advantageously performed by raising a semilunar flap of the soft parts, as proposed by Mr. Guthrie. I should scarcely expect by such an operation to save a very useful limb, but it should never be forgotten that in cases requiring amputation at the hip-joint, it is not only the patient's limb, but his life which is deeply involved.

Excision of the knee-joint is an operation which I have now repeatedly witnessed for chronic disease, but I have no experience of it as a primary operation. A good deal of discussion has recently taken place, and several interesting cases of the excision of this joint have been brought forward, particularly by Mr. Jones of Jersey, and by my late colleague Dr. Mackenzie. Of the latter I saw some when under treatment, but am not enabled to speak as to their final result after a lapse of time; and looking to the very tedious cure in some instances, and the imperfect use of the limb in others, I cannot say that I have been strongly impressed with the utility of this operation. An amputation above the knee, however, I have long looked upon as a very hazardous operation from the constitutional disturbance which the removal of so large a portion of the body necessarily involves, and looking to the excision of the knee joint as likely to involve less of this constitutional disturbance, I would not be thought to discourage it as a primary operation.

In cases of compound luxation at the ankle-joint, the removal of the protruding extremity of the tibia by the saw, and the removal of the astragalus when protruding, has sometimes been resorted to. Indeed, the complete excision of this joint has recently been undertaken, but it is not easy to fore-

see circumstances likely to occur in the field in which it would be advisable. Upon this point Dr. Dumbreck says, "I think we attempt to save too many ankles. When this articulation is seriously injured, we ought to have recourse to Mr. Syme's operation, or some modification of it."

In concluding these observations on wounds of the Head, Trunk, and Extremities, I am enabled, through the kindness of Deputy-Inspector Marshall, to introduce an abstract of the returns of cases of gunshot and arrow wounds which were made to him by six of the medical officers employed in the Kandyan provinces in Ceylon during the insurrection of 1817 and 1818, from which it appears that "of eighteen cases of gunshot wounds in the head, neck, or trunk, two died and sixteen recovered; of twenty-two gunshot wounds of the extremities, none died; of sixteen cases of arrow wounds of the head, neck, or trunk, one died and fifteen recovered; of twenty-five arrow wounds of the extremities none died.

"In some instances among the arrow wounds, the arrow had transfixed one thigh of a patient, and slightly wounded the other, and one or two examples occurred where the arrow penetrated the thorax, wounded the lungs, and thereby occasioned hæmoptysis. Many of the arrow wounds healed by the first intention, and some where a leg was transfixed. Of the eighteen men who were wounded in the head, neck, or trunk, by means of musket balls or iron slugs, the balls or slugs were extracted from all of them except three, and of those wounded in the extremities one ball was not extracted.

"Under the head 'recovered,' are here included all those cases who were discharged from the hospital, whether they had become efficient as soldiers or not. I have before me the description of forty-eight cases of gunshot and eleven of arrow wounds, which came under the care of three other medical officers during the above period; but as a considerable number of these cases were transferred to hospitals out of my district while their wounds were still open, I am unable to state the results satisfactorily."

This return I consider interesting, not only as embracing a description of wounds of which we know comparatively little, and of which English surgeons in general have little experience, but as a specimen of the kind of information which, if given

upon a large scale and on a systematic plan, could not fail to be highly instructive. Were we furnished with such an abstract as this of the wounds occurring in every battle, siege, or campaign, with a statement of their results, and a summary of the chief means of treatment, we would speedily acquire a knowledge of what was to be expected in any given circumstances as regards the description of enemy opposed to us, the nature of the service to be accomplished, and the influence of climate, season, and other circumstances in the treatment of wounds.

LUXATIONS.

In considering injuries of the extremities, I am induced to offer a few remarks on the subject of luxations of the joints, because it will be observed, from the paragraph formerly quoted, that luxations are included amongst those accidents by which soldiers are too frequently incapacitated for their duties ; and it should also be known that luxations have sometimes been produced in the infliction of punishments heretofore in use in the service, instances of which I shall have occasion to notice.

Independently of the necessity which these considerations impose upon the military surgeon to study the mechanism of luxations and to prepare himself for their successful treatment, he should ever bear in mind that there is no one instance in which the comfort of a patient, or the reputation of a surgeon, are more completely and more frequently involved than in the treatment of luxations. Here the popular prejudice is decidedly against us, and we often find well-informed people ready to lend a willing ear to stories of the superior skill of a country bone-setter. In proportion as a man is eminent in the other branches of his profession, he is very frequently supposed to be ignorant of this particular department ; and while I am very far from giving the most distant countenance to such an opinion, I cannot divest myself of the knowledge of many mistakes which have happened in the hands of scien-

tific surgeons, and have tended to confirm vulgar prejudices. Every person knows the superior facility with which luxated bones are replaced immediately after accidents, and how much all the difficulties of reduction are aggravated by the lapse of time. Much is here to be gained by accurate knowledge and prompt decision; much may be lost by doubt and delay. In luxations of long standing, adhesions are formed, and in some instances an ossific deposit is thrown round the extremity of the luxated bone, presenting an almost insuperable obstacle to its reduction.

A dislocation recently produced, where the head of the bone has escaped from the articular cavity, and retains the position into which it was first thrown, is termed a primary luxation, in contradistinction to what is termed a consecutive dislocation, where, by the continued action of the muscles, a dislocated bone is drawn into a different position from that which it occupied immediately after the accident. Now, as the military surgeon has, for the most part, the advantage of seeing luxations in their primary state, he has not those obstacles to encounter which are met with in secondary or consecutive dislocations, and this circumstance will no doubt be observed to his prejudice whenever he fails in the reduction.

In considering more particularly the subject of dislocation, we find that the more varied and extensive the motions of which a joint naturally admits, so is it more liable to luxation. Thus in joints simply admitting of flexion and extension, as the elbow and knee joints, luxations are less frequent than in the joints of the hip, and especially of the shoulder. Much is added, in some cases, to the security of joints by a large articular surface and a powerful ligamentous apparatus; of this we have a remarkable example in the knee-joint. But in proportion as this joint is secured from luxation by a complex structure, so are its wounds more dangerous and its diseases more frequent. As a general rule, it may be remarked that while the surrounding muscles form the principal security of joints in their sound state, they also form the principal impediments to reduction in a state of luxation. It is now very generally understood that lacerations of the capsular ligament sufficient to admit of the displacement of the head of a bone,

are equally sufficient to admit of its replacement, and there are few if any cases in which we can consider the smallness of the breach in the capsular ligament to be an obstacle to the reduction of the bone. Hence it is to the resistance offered by a contraction of the surrounding muscles that we must chiefly ascribe the difficulty in reducing luxations—these muscles drawing the head of the luxated bone as far from its natural receptacle as the connections of the neighbouring parts will admit.

The principal diagnostics in cases of luxation are pain in the region of the joint, inability to perform the usual rotation or flexion, an unusual protuberance or an unusual flatness of the affected joint, and in general a remarkable lengthening or shortening of the limb. In some cases, a certainty as to the nature of the accident may be obtained by our being able to feel a vacuity in the region of the joint, while the head of the bone may be felt prominent in a new position. This is very often perceptible in luxations of the shoulder-joint, and affords one of the most perfect diagnostics. The existence of a luxation being once ascertained, the obvious and the only indications are to replace the bone as speedily as possible, and to restrain the motions of the joint until the contiguous parts shall have recovered from the injury they have sustained.

To effect the replacement of dislocated bones various mechanical contrivances have been employed, but with these, of which the pulley is the only one now in general use, the military surgeon can seldom expect to be furnished; and in recent luxations, particularly of the smaller joints, a sufficient extension may be made by the hands of the surgeon; in the larger joints by means of lacs, towels, or sheets passed round the limb, and pulled by a sufficient number of assistants. In all cases great care should be taken to make the counter-extension, or, in other words, to fix the trunk or superior part of the limb in a way the most perfect, and least injurious to the patient; and in luxation of the shoulder and hip-joints, the scapula and pelvis are to be made as far as possible fixed points. With regard to the point at which the extending force should be applied, some difference of opinion prevails. The French surgeons for the most part apply it to the extreme part of the limb, leaving an intervening joint between the

dislocated one and the point to which the extending force is applied. Thus in luxation of the shoulder they apply the lac or pulley to the wrist, and in luxations of the hip they apply it above the ankle. In support of this practice it is alleged that we act with more advantage by a lengthened lever, and avoid compressing or exciting a spasmodic contraction of those long muscles which extend over the luxated joint to that situated next below. In reply to the first allegation, it may be observed, that when the extension is complete, no powerful lever is required to replace the head of the bone; and as to the other, it is to be recollected that those muscles which pass over two contiguous joints are mostly tendinous at their insertions: and although spasm might be excited by compressing the fleshy bellies of these muscles, the same thing will not happen from compressing their tendinous extremities. As to the direction in which the extension is to be made, the only rule which admits of general application is to extend the limb in the direction in which the dislocated bone stands, but where this is not immediately successful, the surgeon naturally tries those other positions which his knowledge of the structure of the joint, and the laws of mechanism suggest.

I have already observed that it is chiefly the powerful resistance of the muscles surrounding a joint which we have to overcome in the reduction of luxations; and hence much may be gained by putting the limb in such a position as to relax those muscles from which we chiefly expect resistance. It is found also that muscles may be fatigued or worn out, and in some measure paralysed, by long continued extension; hence the advantage of pulling in a gradual and regular manner, instead of attempting to effect the extension by a short, interrupted or jerking motion. The only instance in which a sudden manœuvre of this kind succeeds, is when, by drawing the patient's attention to some other subject, the opposing muscles are, as it were, taken by surprise, and the reduction effected before they are prepared for resistance. This power of resistance in the muscles, it is well known, is greatly lessened, indeed almost annihilated in a state of faintness or syncope, and hence, a practice at once rational, judicious, and successful, has been instituted with a view of artificially producing this state. For this purpose the employment of general blood-

letting, of the warm bath, and of nauseating doses of antimonials are in general use, and are often attended with the happiest effects. Since the general administration of chloroform in surgical cases, I have seen numerous instances of its successful employment in the reduction of old-standing luxations, and indeed have been led to look upon this as one of the happiest uses of this new anæsthetic agent.

In cases of compound luxation, when the bone is protruded through a wound, the injury is often so severe, and the subsequent inflammation so great, as to have led some writers to recommend the immediate removal of the limb—a measure which is not, however, to be adopted as the general rule; nor do we admit generally the propriety of removing the protruded extremity of a bone, for the purpose of facilitating reduction. This may in most cases be accomplished without it; and the reduction once effected, our object is to heal the external wound as speedily as possible. For this purpose, its edges are to be brought into accurate apposition, and secured by straps of adhesive plaster; or, what sometimes answers exceedingly well in recent cases, the wound may be bound up in a pledget of lint soaked in blood.

In luxations, the circumstances are in a great measure the reverse of those which occur in fractures. It is by a thorough knowledge of general principles that we must be prepared to vary our practice, so as to adapt it to the endless variety of fractures which we meet with. Luxations again take place for the most part in particular directions, so that the injury is of a more specific character, and every case becomes more an object of individual study, and may be treated according to established rules. These rules are so fully laid down in the common systematic works upon surgery, that it would be quite superfluous to go over in succession the luxations of the several joints, particularly as they offer no such peculiarities in military practice so as to render them fit subjects of observation here; and I shall therefore confine my remarks to a few cases, which, either from their peculiar nature, frequent occurrence, or serious consequences, become objects of particular interest.

Dislocation of the lower jaw is frequently produced by blows in the face, particularly when the mouth is open, and this

accident has also been produced by the practice of gagging, sometimes employed in the army and navy, to prevent men from uttering insubordinate, abusive, or mutinous expressions. In recent cases this luxation is attended with severe pain in the situation of the joint, and inability to close the mouth. If the luxation is partial, that is to say, of one side only, the *symphisis menti* is turned somewhat to the opposite side; if complete, the chin is advanced directly forward, and the teeth of the lower jaw project beyond those of the upper. This luxation when recent is for the most part easily reduced by introducing the thumbs, guarded with a napkin or roller wrapped round them, along the course of the molares, and thus depressing one or both sides of the jaw as may be necessary. When this depression is effected so as to disengage the condyle from its new situation under the zygoma, the muscles tend forcibly to replace the jaw in its proper situation, and to shut the mouth violently—an occurrence which renders it prudent for the surgeon to slip his thumbs out laterally towards the cheek as speedily as possible. Some writers have recommended the introduction of a wooden lever, which being rested on the superior molares as a fulcrum, may be used to depress the lower jaw, but every mechanical expedient of this kind is for the most part unnecessary, and is liable to injure the teeth.

In the thirteenth volume of the Edinburgh Medical Journal, there is an interesting detail of the case of a seaman, named Payne, in which luxation of the lower jaw was produced by gagging. The commanding-officer of the ship, who had directed the punishment, was tried by a court martial, and acquitted on the ground that the practice of gagging was customary in the service, and that, in this case, there was no unusual severity employed. In consequence of the man's violence, who bit through one or more gag-sticks, and in consequence of his jaw having been twice dislocated by former accidents, the luxation in this case became permanent, and reduced this individual to a state of misery, which should prevent any military or naval surgeon from being accessory to such a punishment, without warning his commanding-officer of the consequences which may happen. "The distortion and disfigurement of countenance produced by this injury

are very great, disgusting, and humiliating. The constantly open mouth, and dribbling of saliva from the depending jaw, convey the impression of idiotism; and this impression is perhaps heightened by the unnatural length of visage and projecting chin, consequent on the morbid position of the lower jaw-bone. Thomas Payne may be said to have lost articulate speech; for although he certainly can speak, and much better even than could have been expected *a priori*, yet when the relative position of the jaws and lips is considered, it will readily be understood how very imperfect his articulation must be. His teeth are all encrusted with tartar and sordes for want of use, like the stones of an unfrequented street half-hid in ill-placed vegetation. He complains of a constant though slight pain in the place of the condyles; and this pain becomes severe when the jaw is attempted to be forcibly closed, or the bone moved from its unnatural position. He particularly complains of the great sense of uneasiness he experiences from the dryness and coldness of the mouth, evidently arising from the constant evaporation of the fluids from that cavity, thus unnaturally and constantly subjected to the action of the external air. These uneasy feelings appear to be peculiarly severe during the night, and frequently prevent sleep."

Dislocation of the shoulder-joint, it has already been remarked, is one of the most common accidents of this kind, and for a great deal of valuable information on its various modifications, I would refer to a paper by Monsieur Marx, in the 7th volume of the Repertoire d'Anatomie, from which we may learn, on the one hand, that this luxation has in several cases been successfully reduced after a great lapse of time; in one instance, the reduction was effected by M. Sanson, so late as the 98th day. From another paper in the third volume of the same work, by Monsieur Flaubert, we learn the bad consequences of violent or injudicious attempts to effect the reduction in cases of long standing, such as rupture of the axillary artery, rupture of the axillary nerves, and even death itself. Of this formidable accident, rupture of the artery, two cases have recently occurred in America. Luxation of the shoulder has been produced by the punishment of picketing, formerly used in cavalry regiments; but as this punishment is now

abolished, and as the nature of the accident itself offers nothing peculiar in military life, it is unnecessary to dwell upon it here.

Dislocation of the elbow-joint backwards, the only direction in which a complete luxation occurs, is not an accident difficult to detect, nor, so far as my experience goes, difficult to reduce if speedily attended to; but the many instances I have seen of partial dislocations and other injuries of this joint which have either been overlooked or misunderstood, induces me to notice the following case which came under my care in the Royal Infirmary some time ago, and in which a partial luxation of this joint had been mistaken for a fracture, the patient's arm being found, upon her admission, secured in splints. "On either side of the upper arm there is a pasteboard splint, tightly confined by a roller, the lower part of the limb very tense, and somewhat discoloured, the fore-arm has not, according to the usual method of treatment, been placed at a right angle with the upper arm, but forms an obtuse angle with it, and cannot be either bent or extended farther." Upon the removal of the splints, the head of the radius was found lying behind the outer condyle of the humerus; the entire outer surface of the olecranon was felt through the soft parts, and there was a distinct depression above this process of the ulna; the humerus was indistinctly felt lying on the anterior surfaces of the bones of the fore-arm; crepitus was quite evident, but appeared to arise entirely from the friction of the displaced bones upon each other, and no crepitus could be detected when the two extremities of the humerus alone were moved in opposite directions. The dislocation was reduced by bending and extending the fore-arm over the knee. The fore-arm was afterwards bent to a right angle with the upper arm, and supported by a sling; a cold lotion was applied to the inflamed parts. In a few days the patient began to have a little passive motion of the joint, and on the twelfth day was dismissed cured.

Since the above was written, I have seen two instances of displacement of the head of the radius forwards, one of them in a recruit, where the motion of the limb was so little impaired, and the deformity so slight, as to have escaped the notice of a most intelligent and experienced staff-surgeon.

When this man was subsequently brought before a medical board, of which I was a member, he was recommended to be discharged, rather from the apprehension that he might at some future period make a convenience of this accident, and use it as a pretence for evading his duty, than from an opinion that he was inefficient. Although one would not willingly make a remark which could give countenance to any thing like negligence in practice, yet there is no disguising this truth, that injuries of the elbow-joint, even when treated most carefully, and by the most experienced surgeons, are not unfrequently followed by stiffness and impaired motion; while on the other hand, even when carelessly treated or altogether overlooked, we sometimes find them followed by little or no permanent injury.

The dislocation of the thumb, in which the head of the metacarpal bone is found projecting towards the palm of the hand, was first particularly noticed by Mr. Hey of Leeds, and since his time has been the subject of numerous observations. In commenting upon the case of a patient named Murray who appeared at the Royal Infirmary some years ago, with an old irreducible luxation of the thumb, I find the following remarks in one of my printed clinical lectures:—"This is a case, I remarked to you, of which no one will readily estimate the difficulty who has not experienced it; but the numerous cases which I have mentioned, where all attempts at reduction had failed in the hands of the most eminent surgeons both in this country and in France, will, I am sure, incline you to look with an indulgent eye on every unsuccessful attempt which you may hereafter have occasion to witness, and will stimulate you to avail yourselves of any opportunity which may present itself of dissecting the joint in its dislocated state, and explaining the real cause of the difficulty in reducing this luxation.

"Of this troublesome accident I met with two instances about thirteen years ago, in the persons of two young soldiers, which you will find recorded in the 11th volume of the Edinburgh Medical and Surgical Journal. In one of these cases I failed, and in the other my efforts were successful. My failure occasioned me more annoyance at the time than it will ever do again, now that I know how very far it is from being

singular; and as to my success, gentlemen, I wish I could persuade myself that it was any thing more than accidental. It is right, however, to observe, that in most, if not all of the cases where the reduction has been accomplished, it has been undertaken at an earlier period than in Murray's case; and that this reduction has been effected rather by pushing than by pulling the bones into their natural situation."

I regret to say, that out of five cases of this luxation which I have now seen, only two have been reduced, one of them after the division of the lateral ligament, or other obstacle, by incision. When the accident happens to the right thumb, as was the case in both of my own patients, if the luxation remains unreduced, it renders a soldier incapable of some of the necessary motions with the firelock, and nothing can be more vexatious to a military surgeon than to lose the services of a gallant young soldier, from an accident apparently so trifling. In the paper above referred to, I attempted an explanation of the difficulty in reducing this luxation, founded chiefly on a consideration of the action of the adductor and abductor muscles, and submitted the following remarks in the form of a query. "What situation does the tendon of the flexor brevis occupy in this dislocation? Is it possible that the head of the metacarpal bone may be forced through between the two portions into which the flexor brevis naturally divides to form a groove for the tendon of the flexor longus? If so, the two portions of the muscle when thrown into action would grasp the metacarpal bone, and present an obstacle to the reduction, precisely in the same way as Mr. Hey supposes the lateral ligaments to do, but much more considerable, in as far as the resistance of the living muscular fibre exceeds that of ligament." In a late number of the Lancet, 13th March 1852, there is, after the lapse of forty years, a remarkable confirmation of the justice of my conjecture, in the notice of a paper by M. Demarguay, from the Bulletin de Therapeutique. This gentleman observes, that "in a complete luxation of the thumb backwards, the following changes take place:—The metacarpal extremity of the first phalanx comes to rest on the posterior portion of the articular surface of the first metacarpal bone; and the phalangeal extremity of the latter projects under the skin, after having passed through between the two portions

of the flexor brevis pollicis, the external portion being frequently torn. The phalangeal extremity of the first metacarpal bone is thus caught in a loop, formed externally by the outer part of the flexor brevis, and the abductor, and internally by the inner portion of the flexor brevis, the adductor pollicis, and the strong tendon of the flexor longus pollicis."

Upon dislocation of the hip-joint I have no particular observations to offer, either as regards the nature of the accident or its connection with military life, but I cannot omit noticing the valuable sketches which Sir Astley Cooper has given of the different positions of the limb in the accidents affecting this joint. These are admirably adapted to impress upon students the diagnostics of the several luxations, and as a teacher I feel grateful for the facility which I derive from them in explaining the nature of these accidents.

Of compound dislocation of the knee-joint, I have seen two instances—in one of these the limb was amputated, and in the other the patient died without amputation. A simple and at the same time a complete luxation of the knee is an occurrence which I have never met with, and which I believe to be exceedingly rare. The nature of such an accident must be immediately conspicuous, and the replacement of the dislocated bone is not represented as being very difficult.

Dislocation of the patella is not an unfrequent accident, and is liable to happen to cavalry soldiers in particular, by striking each other's knees in the ranks. The most frequent displacement of this bone is towards the outside, over the external condyle of the femur, and, for the most part, it is easily replaced, by extending the knee-joint, bending the limb upon the trunk at the hip-joint, so as to relax the extensor muscles, and then pressing upon the outer edge of the patella, elevating its inner edge over the condyle of the femur. In some cases, however, where this mode of proceeding has not been successful, the dislocated patella has been reduced by bending the knee to the utmost. This was mentioned to me by Dr. Evans of Salisbury, when attending my class several years ago, as a mode of proceeding with which he was familiar, but I confess it was quite new to me when brought to the notice of the profession in 1828, by Mr. Mayo and Mr. Broughton of the Life

Guards, who adopted it in the case of a soldier of his regiment whose patella had been dislocated in consequence of being "struck sharply on the right knee by the knee of another soldier, as, in the exercises, two opposite lines rode through each other." The views which induced the gentlemen concerned to adopt the expedient of bending the knee are given at length in the second volume of the Medical Gazette, where the case is detailed, and the following was the result:—"The patient was laid upon the left side, and his right ankle was grasped by a comrade, who, when we bade him, suddenly carried the heel back to the hip, thus bending the knee to the utmost. This motion was hardly completed when the patella audibly returned into its socket."

The patella, from a similar accident to that which happened to Mr. Broughton's patient, has been known to undergo "a semi-revolution on its own axis, its inner edge resting fixed in the trochlea, between the condyles of the femur, the outer projecting directly forwards." A case of this kind occurred some years ago to a private in the Queen's Bays, in the cavalry barracks here, and was speedily reduced. Another case, occurring also to a person riding on horseback, is noticed in the New York Medical Journal for October 1839; and in that case the reduction, after ineffectual attempts in the extended state of the limb, was accomplished by forcibly bending the knee-joint and suddenly straightening it again. From the case of a private in the Prussian hussars, which is detailed in Rust's Magazine, it would appear that the difficulties of reduction were in that instance so great as to induce the surgeon to cut across both "the common tendon of the extensor muscles above, and the ligament below the patella." Even this desperate measure was unsuccessful, and the patient died of the consequences.

Dislocation of the ankle-joint, with fracture of the lower part of the fibula, is a case of every-day occurrence, and its treatment is well understood, particularly since the publication of Dupuytren's memoir on fractures of the fibula, in which a simple and effectual apparatus is recommended. The ankle-joint is remarkable as being one of the most common seats of compound dislocation; and although I have known several instances of recovery from that accident, yet, in severe or

complicated injuries of this kind, and particularly when a patient cannot be immediately and permanently placed in favourable circumstances, as often happens in military life, the surgeon will perhaps best consult his patient's interest by an immediate removal of the limb.

Dislocation of the Metatarsus is an accident which I have never seen, and of which very few instances are on record, but a very interesting case, occurring in the person of a soldier of the 7th Dragoon Guards, has lately been detailed by Mr. Tufnell, in the Dublin Quarterly Journal of Medical Science for February 1854. "The trooper was walking his horse cautiously, the road being very slippery from frost. Whilst turning a corner bordering upon the canal, the animal suddenly slipped and fell with his whole weight upon the soldier's right leg and foot, crushing it against the ground." The patient being seen a few minutes after the accident, its nature seems at once to have been recognised, but, unfortunately every attempt at reduction failed. Mr. Tufnell, in his paper, which is too long to insert here, and cannot be abridged with advantage, contrasts this case with others in which partial dislocations between the tarsal and metatarsal bones have taken place, and has been kind enough to send me a cast of the foot, which may be seen in the museum.

In taking a retrospective view of the several luxations, I would observe, that those of the shoulder and of the hip-joints are accidents the nature of which has been well investigated, and the treatment of which is as satisfactory as the circumstances warrant us to expect. The luxations and injuries of the elbow-joint are so numerous and obscure as to render them fit objects of future inquiry. The luxation of the thumb, to which I have adverted, is an accident of which the nature seems now to be satisfactorily explained, but of which the treatment is very unsuccessful. Luxation of the patella is liable to occur from an accident to which horsemen are frequently exposed, and its reduction is sometimes difficult—its consequences, as we have seen, having in one instance been most deplorable. Luxations of the ankle-joint are, in their simple state, treated, for the most part, with facility and success; in their compound form they are accidents of a very dangerous character.

AMPUTATION.

Amputation, is, in every point of view, a subject fraught with peculiar importance to the military surgeon, and the number, variety, and urgency of the cases involving the question of amputation, which occasionally crowd upon him, render it an imperative duty to prepare himself for their successful treatment by the study and practice of this operation.

Convinced that there are many points relative to amputation and to the dressing of stumps, which can only be taught by demonstration on the dead body, or by practice on the living; and convinced also that the plan of operating, particularly in military practice, must be greatly modified by the nature of the case requiring it, it is not my intention to enter into any minute description of the different steps of this operation, which are well described in numerous surgical works. I shall briefly state what I conceive to be the best mode of proceeding in the amputations most commonly practised, and advert to some general circumstances regarding amputation, of which the most important for the consideration of the army surgeon are,—the nature of the cases which demand its performance; the period at which it may be most advantageously adopted, and the best mode of its execution. To each of these in succession we shall direct our attention, introducing some historical notices of the operation with which it becomes every army and navy surgeon to be acquainted, and for which I am almost solely indebted to the valuable account given of this operation by my learned predecessor Dr. Thomson.

To whom the honour is due of having first advised or performed the amputation of a limb, I am unable to say; but from the way in which it is spoken of by the older surgeons, it is obvious that the operation was confined at first to cases of injury followed by gangrene. From their directions to cut below, to cut through, or to cut immediately above the line of separation between the living and the dead parts, it is obvious that they seldom or never thought of primary amputation; that their operations were all secondary; that in short they only ventured to complete a division which nature had begun.

Their imperfect knowledge of the circulation, and of the means of controlling the hæmorrhage, rendered it an operation to which they were naturally averse, while the less formidable nature of the wounds received in battle previous to the invention of gunpowder, rendered amputation less frequently necessary. The first person by whom we find this operation recommended in severe injuries of the limbs, is Duchesne, a military surgeon, whose work is dated in 1625; and it is worthy of remark that he directs the operation to be performed before inflammation and other constitutional symptoms shall have supervened; but how long this recommendation remained a barren precept, or by whom it was first actually carried into execution, is not easily ascertained.

It is obvious, however, that after surgeons became familiar with the use of the tourniquet, the needle, and ligature, these means equally facilitated the performance of the operation, and rendered its adoption more frequent. Recommended in France by La Charriere and Saviard, it seems to have so far captivated the fancy of the junior surgeons, as to have run some risk of being abused. The number of amputations in the military hospitals became a subject of raillery and reproach among the vulgar; and we find Dionis labouring to remove from the mind even of the King, Louis the Fourteenth, the impression that the limbs of the soldiers were in as much danger from the ardour of the young surgeons as from the fire of the enemy. The execution of this operation is a task to which every surgeon considers himself competent; and we are not now hampered in deciding upon the propriety of this step by those difficulties in its performance which fettered our predecessors. Although the removal of a limb must always appear to a patient and to the bystanders a very formidable undertaking, yet to a surgeon it is perhaps of all the capital operations the most easy of execution. It has been often observed that the proposal of amputating a limb necessarily implies a confession of our inability to cure it; and in proportion as the art of surgery has been improved, so have those cases diminished in number where the amputation of the limb is considered indispensably necessary. Many cases, however, still remain, and it is probable that many will ever remain. "where," to use the words of Mr. Pott, "the patient's life is

much more put to hazard in an attempt to save the limb than by the operation in removing it; where, in short, as it has been somewhat quaintly expressed, 'it is better for a patient to live with three limbs than to die with four.'"

In civil life there are many intractable diseases, such as cancerous affections, malignant growths, white swellings, &c., which demand the removal of limbs; and in the practice of military surgery the following are amongst the most common and most obvious cases which require amputation:—1. Cases where a limb is completely carried away, leaving a ragged stump, with laceration of the soft parts and projection of the bone. 2. Cases of lacerated wounds, with loss of substance, rupture of the blood-vessels and nerves, with extensive denudation of the bone. 3. Cases of compound and comminuted fractures, particularly those high up in the inferior extremity, and those involving joints. All injuries of the foregoing description which occur in battle are for the most part *prima facie* cases for amputation; but much depends upon the extent as well as upon the nature of the injury, and much also upon the accommodation and attention which a patient is likely to receive. The treatment of sick and wounded in a victorious army, having the command of an abundant country, and at a favourable season of the year, may be in many respects very different from what it would be in a retreating army after a defeat.

Wherever limbs, under the circumstances above described, have not been immediately removed, they are liable to fall into gangrene; and it then becomes an important question whether we should proceed to amputate the limb, or await a spontaneous termination of the gangrene. As the cases in support of the practice of amputating during a spreading gangrene are still limited in number, I may be permitted to state particularly the result of my own experience upon this point, which at the time the first edition of this work was published, stood as follows:—I had then operated once myself, and had twice seen amputations performed by other surgeons during a spreading gangrene. Of these three cases, one died soon after the operation, but without any gangrene attacking the stump; another survived the operation for ten or twelve days, without any return of the gangrene, and upon dissection,

he was found injured internally, one of his ribs was broken, he had effusion into the pericardium, and some small abscesses in the liver; the third made a perfect recovery. Since the above period I have seen three more cases, of which one has been saved, and in another the gangrene recurred. Upon the whole, I consider my own experience rather favourable to the practice, at least inasmuch as gangrene did not attack the stump in any of the above-mentioned instances, except one.

The proper period for amputation is a question upon which much discussion has taken place, since the use of the tourniquet and the ligature has made this operation more a matter of option than formerly. We are not now compelled to resort to it as a desperate expedient, as a forlorn hope, after the failure of other means, but have the choice of adopting it from the first, wherever it may promise to benefit our patient by alleviating his sufferings, by shortening his confinement, or by affording him the use of an artificial limb, when we can have no hope of preserving the utility of the natural one.

But before proceeding farther with the general question of primary and secondary amputation, it is necessary to advert to a point regarding primary amputation, which has been very keenly discussed by two distinguished writers of the present day,—I allude to the propriety of amputating immediately after the receipt of an injury requiring it, or of waiting until the patient recovers from that state of collapse and disorder of the system which is a common consequence of severe gunshot wounds. Mr. Hutchison, along with several other navy surgeons, has denied that any such collapse follows these injuries as to prove a bar to the operation, and that where numbers are wounded the requisite operations should be performed in as quick succession as the surgeon can possibly overtake them—that, in short, the maxim of "making the knife follow the shot as speedily as possible," is the correct rule of practice. Mr. Guthrie again, and several of his professional brethren, both in military and in civil life, have seen the necessity, in many cases, of deferring the operation for a few hours, endeavouring to rally the patient and to prepare him for it by the administration of cordials and consolatory language. That this is sometimes requisite I have no manner of doubt.

and with all possible respect for Mr. Hutchison's opinion, I cannot avoid saying, that if his advice was to be uniformly followed, I fear that we should sometimes have to regret the precipitate performance of unavailing operations. I am led to say this from the recollection of two remarkable cases, one of which occurred during my apprenticeship, and the other a few years ago. In these cases the patients had sustained such injuries in their limbs as to be deemed fit subjects for amputation, while no suspicion existed of internal injury. In the first case the patient, who was injured by an explosion in a quarry, was lying in a state of collapse, which was expected to be transient, and in the hope that it would pass off, I was sent away for instruments to amputate the limb, but on my return found that my master had changed his mind, and had begun, very shrewdly, to suspect, from the man not rallying, that he was hurt internally, which proved to be the case, and he died in the course of the ensuing night. In the other case the patient had thrown himself from a window, and I was prevented from instantly amputating the man's limb by the opposition of his relatives, he being himself in a state of maniacal excitement. Upon calling a few hours afterwards to see if they had altered their minds, I found my patient in a state of collapse, sinking with symptoms of internal hæmorrhage, and upon more minute examination I felt an obscure crepitus indicating, I believe, a fracture of the pelvis, but no dissection was obtained.

This last case leads me to observe that the state of excitement under which a man receives a wound or undergoes a severe surgical operation does not instantly subside after the receipt of the one or the termination of the other, and that sometimes the constitutional shock does not supervene till some distance of time. This has even been suggested to me as a possible explanation of the difference of opinion between some naval and military surgeons upon the point of delay. It has been suggested that within the limits of a ship the wounded are necessarily so near the surgeon that they may always be seen by him before the collapse occurs, while in a great land-battle it is often otherwise. It has also been said that the seaman generally goes into action in a full and vigorous state of health, while the soldier is often debilitated by the privations and fatigues of a previous campaign, and that

this may render the state of collapse after wounds more frequent or more marked in the one service than in the other. But these circumstances do not afford to my mind a satisfactory explanation of the difficulty, nor do they exist to such an extent as to lead to opposite results; and although at a loss to reconcile the conflicting statements upon this point, I am pleased to observe that the sentiments of a surgeon are not to be regulated by the department of the service to which he happens to belong. In one of the most recent works upon this subject, that of Sir Stephen Hammick of the navy, the author distinctly admits the necessity, in some cases, of "allowing the patient to recover a little from the shock of the accident" previously to the amputation of his limb. This I confess I am greatly pleased to see, not so much because it supports my own view of the matter, as because it takes away from this subject the semblance of a party question between the surgeons of the two great branches of the public service—a colouring which some have been disposed to give to it, and which I am confident, from the high professional character of the two gentlemen who have chiefly agitated this question, that they would both have been very sorry to see it assume.

Our celebrated surgeon Wiseman had evidently considered the question of primary and secondary amputation, and he gives a decided preference to the former. It does not appear however that Wiseman was in the habit of performing amputation except in the extreme parts of the limbs; and no instance is I believe recorded in his works, nor in those of his predecessors, of immediate amputation above the knee. In the work of Le Dran on gunshot wounds, published in 1737, we have the first, and one of the most distinct statements of the comparative advantages of immediate and delayed amputation, this writer being a decided advocate for the former. Our countryman Ranby, sergeant-surgeon to King George the Second, although he does not enter minutely into an enumeration of those cases in which amputation may be required, is decidedly an advocate for the immediate performance of this operation when it is absolutely necessary. In consequence of the conflicting opinions which existed amongst the French surgeons on this point, and in consequence also of repeated failures in cases of amputation from its being per-

formed in unfavourable circumstances, or at improper periods, the Royal Academy of Surgery was induced in 1756 to offer the following question as the subject of their prize essay:—"Amputation being absolutely necessary in wounds complicated with fractured bones, and particularly those from gunshot, to determine the cases where it is necessary to operate on the field, and those where it may be delayed." Of the memoirs submitted to the Academy in the reply to this important question, those distinguished by the approbation of this body were the memoirs of Le Conte and Faure, to the latter of which the prize was assigned, not so much from any superiority of the memoir, but from the circumstance of its being supported by a few cases in favour of the advantages of delayed amputation, which both writers advocate, in all cases where its immediate performance is not considered absolutely indispensable.

Of cases, however, requiring immediate amputation, Faure has given a most distinct enumeration, which has been very little altered in the writings of subsequent authors. It is therefore unfair, as has sometimes been done, to represent this writer as opposed to amputation in almost all the injuries of the extremities. After recounting several cases in which he considers the operation justifiable, he observes, "in all these six cases I say that the prompt removal of the part injured is the only remedy which surgery acknowledges, on account of the accidents still more troublesome which will inevitably supervene if amputation be deferred." His principal reason in favour of delay seems to have been an opinion that the operation succeeds better in patients whose habits were reduced by sickness and confinement than in those enjoying the full vigour of health—an opinion adopted and strongly insisted on by the celebrated John Hunter, "who," says Mr. Guthrie, "if he had had the same opportunities of acquiring knowledge on this subject as he had on others, would have left nothing to be written on gunshot wounds, and who has erred on a point which could only be decided by personal experience."

The memoir of Faure was successfully combated by Boucher, to whom it had been referred by the Academy of Surgery, and this author contends strongly that amputation

is more advantageously performed in the first than in either of the subsequent stages into which gunshot wounds have been divided. These three stages are—1. "The period between the infliction of the injury, and the occurrence of tension, pain, swelling, and symptomatic fever"—a period of greater or less extent, according to the violence of the injury, and the state of the patient's constitution. 2. "When the inflammatory symptoms have commenced, and have given rise to a constitutional affection, or symptomatic fever." 3. "When the symptomatic fever and constitutional disturbance have abated;" and this is the period recommended by Faure as the most advantageous for the performance of amputation. That this last-mentioned period is more favourable than the second will be readily conceded, although we are decidedly opposed to the opinion which this author seems to entertain, that amputation is not more dangerous after the accession of the inflammatory symptoms than immediately after the receipt of the injury. And I am equally unprepared to admit, what he asserts as a general principle, that the longer the operation is delayed, the greater will be the chance of success.

The question of immediate or delayed amputation was subsequently discussed in memoirs submitted to the French Academy, by Bourdenaave and Bagieu, both of whom advocate opinions similar to those of Boucher, and contrary to those of Faure, who recommended delay. Bourdenaave, in speaking of the cases requiring this operation, admits that it may often become necessary in military practice, when in similar cases occurring in civil life it might be dispensed with. The necessity of moving the sick from place to place, and the injuries which this movement, in cases of fractured limbs, often superadds to the original mischief, are the circumstances upon which he founds this very accurate opinion. Soon after these discussions in the Academy of Surgery in France, Bilguer, Surgeon-General to the Prussian army, published opinions on the subject of amputation so singular, supported with so much confidence, and enforced by such an extent of practice, that his memoir on the subject attracted very general notice, and its celebrity was perhaps enhanced by "a shew of humanity, which, whether specious or real, is well calculated

to excite public sympathy." Such language as Bilguer adopts will always have its effect until due reflection shows its absurdity. "To cut off a limb," says he, "after a bad wound, what is it but to add wound to wound, to heap new pains upon a disordered system?"

The frequent failure of this operation in the Prussian service previous to the time of Bilguer's appointment as Surgeon-General, seems to have made an indelible impression upon his mind of its inutility, and so soon as he acquired the power, he lost no time in enforcing his opinion of its impropriety. A general order was issued forbidding its performance in any case, and at the conclusion of the war we find Bilguer boasting, that amidst six thousand wounded, the Prussian surgeons had not amputated a single limb. Whether this ought to redound to their praise or their shame may be inferred from Bilguer's own showing, by which it appears that one-half of those who had gunshot fractures of the extremities died, and of the remainder, more than one-half were left in a state totally unfit for any kind of employment, civil or military. That out of 6618 patients, he should not have been able to adduce more and better instances of recovery than the few which he has related, must astonish every one who has seen even the hundredth part of this number of wounded soldiers. Out of three hundred cases of wounded limbs with fractured bones, he states eleven as instances of surprising cures. To these, however, so far as his account enables us to form an opinion, we are by no means disposed to attach the same importance as their author does. They are quite destitute, as Dr. Thomson observes, of that accuracy and minuteness of detail which can render them interesting or useful; and we do not, I think, pronounce too harsh a sentence on Bilguer's practice, when we affirm, that by this general and indiscriminate condemnation of the operation of amputation, he must of necessity have sacrificed many lives, which, under a different mode of treatment, might have been preserved.

But it can neither be necessary nor advantageous, at this time of day, to enter into a more detailed refutation of the opinions and practices of Bilguer, which has been so amply and successfully done by Martiniere and Morand in France, Van Gescher in Holland, Mr. Pott in England, and in this

very city, by Mr. John Bell. That limbs have been saved, even when, as Bilguer expresses it, they have been so severely shattered as to hang dangling from the body, "huc illuc labentes atque pendentes," I will not go so far as to deny; but when he asserts that he has always cured such cases, I must be excused for withholding my belief. Of the extent of suffering and the expense of general health at which such shattered limbs are preserved, we may judge from an interesting case quoted by Mr. John Bell from a memoir by Cannac in the collection of the French Academy. This patient was two years under the hands of his surgeons, and six years more wandering about from one watering-place to another, with open sores and exfoliating bones—"eight years in the flower of life was a dear purchase even for a perfect cure!" But in adverting to Bilguer's doctrines and his practice, I have deviated from the more practical and important question of primary and secondary amputation. The evidence in favour of the former has been at all times preponderant, and the question is now set at rest by the concurrent testimony of Baron Larrey, the most distinguished of the French surgeons during the wars of Napoleon, and by that of the British surgeons who served in the Peninsular war. The results of the united experience of the English surgeons is detailed with precision in the excellent work of Mr. Guthrie on Gunshot Wounds of the Extremities, where there are numerous passages affording the most unequivocal testimony in favour of performing the operation with "as little delay as possible." This is the practical maxim laid down by Dr. Hennen, and inculcated long ago by Le Dran, who says, "Whenever there plainly is a necessity for losing a limb, the sooner it is done the better."

Besides these valuable and highly satisfactory sources of information, I may refer to others bearing upon the same point which are mentioned in the recent work on Operative Surgery by Velpeau. Here we have the results of primary and delayed amputation, as exemplified in the comparative success of the French and American surgeons in 1780, in the results of the amputations performed by Monsieur del Signore after the battle of Navarino, and in the results of the amputations performed in the Parisian hospitals upon those wounded in the revolution of 1830. To these I may add one of the most

striking illustrations which has yet been given of the successful issue of primary amputation, contained in an official report, transmitted to the Army Medical Board by Dr. Burke, Inspector-General of Hospitals, wherein he states, that of "eighty cases of amputation," performed at Bhurtpore in Upper India, "the whole recovered in fourteen days."

The comparative success of primary over secondary amputations, which has been so generally observed in military hospitals, does not take place to the same extent in civil hospitals. Upon this point I have had as good an opportunity of forming an opinion as most of my contemporaries, having now served thirteen years in the former, and nearly thirty in the latter. In civil hospitals the comparative success of primary amputation has been by no means so great as that which I was accustomed to see and to hear of in the army. Sanson, who has noticed this fact, has assigned several reasons obviously leading to a different result; and amongst these, the moral influence of the different circumstances under which a patient is received into a civil and into a military hospital, has always appeared to me one of the most important. A tradesman, who has perhaps an indifferent constitution, and a wife and family dependant upon his exertions, is admitted with an injury requiring amputation, which may be the result of an accident originating in intoxication, ignorance, or folly, and by which he finds himself suddenly reduced to misery and dependence; while the soldier, again, with a constitution originally sound, and accustomed to contemplate such an accident, loses his limb in a good cause, under circumstances creditable to himself and duly appreciated by his country, from which he is certain of a pension for life.

In addition to the powerful effect which this moral contrast must necessarily produce, there is a physical cause operating, which I believe to be one of the most influential, although one of the least observed. A soldier going from a filthy billet or a crowded barrack-room, into a clean, well-aired, and well-regulated military hospital, goes often from a worse atmosphere into a better, while a mason or house-carpenter accustomed to work all day in the open air, is taken into a large civil hospital constantly occupied with its full complement of patients, and having its atmosphere thereby

necessarily vitiated. This circumstance operates, I know, particularly upon patients from the country, almost every one of whom upon admission into our hospitals, goes through a febrile attack, frequently indeed of a transient or ephemeral character, but sometimes of a serious nature. In cases coming in from the country with chronic diseases requiring operation, it becomes an important consideration for the surgeon whether he should operate immediately, and let the symptomatic fever of the operation and the house-fever go together, or let the patient go through his seasoning before he proceeds to operate. I have given a good deal of attention to this point, and am of opinion, that the former is, generally speaking, the best practice.

Of late we have had numerous interesting and valuable statements of the results of amputation. The statistics of this subject, as regards primary and secondary operations, have been given from the American, French, and British hospitals, by MM. Gendrin and Malgaigne in France; by Messrs. Philips, Lawrie, and others in this country. Statements, more particularly bearing upon the comparative results of amputation in reference to the injuries of civil and of military life, have been given by Mr. Alcock. He has very properly adverted to a description of cases which, in the usual statements on this subject, have been too generally overlooked, and specifies as an intermediary class of operations, those which are performed in the second or intermediate period of the three stages, to which I have already adverted in gunshot wounds, viz., the stage when "the inflammatory action has set in, and is more or less capable of disturbing the animal economy." As this, however, is a period which no one, I believe, advocates, or adopts from choice—a period, in short, in which amputations are looked upon as compulsory, and undertaken with reluctance, their number is not likely to be great, and the main question comes again to lie between primary and secondary operations. Mr. Alcock's statements do not go the length of overturning the doctrine so long inculcated by the most distinguished army surgeons, of the superior success of primary amputations in military life, but they tend to confirm the opinions expressed upon this point in the former editions of this work, and to show that this

doctrine has been too extensively and too indiscriminately applied. I have recently been favoured by Mr. James with a paper "on the causes of mortality after amputation of the limbs." It embraces the results of his own experience in the Devon and Exeter Infirmary, for upwards of thirty years, with many statistical tables and interesting notices of the experience of some of the best army surgeons.

Notwithstanding all that has of late been written upon this subject, I think we are still in want, as bearing upon military practice, of a simple and comprehensive statement, upon a large scale, of the results of amputations performed within the first twenty-four hours, and those performed at a subsequent period; giving credit to the surgeons for a due selection of cases, and having reference to the climate, to the period of the year, to the locality, to the nature and extent of the accommodation for the wounded, and particularly to the performance of the operations in a victorious or in a discomfited army—circumstances which are well known to influence in a great degree the result of every disease, accident, and operation.

After these observations on the proper period for amputation, it is now time to advert to the mode of its performance, premising that, as a general rule, in proportion as wounds are inflicted on the distant parts of the extremities, and remote from the trunk of the body, so will the necessity for immediate amputation be diminished. Here the symptomatic fever will, *cæteris paribus*, be less violent, and the patient will run less risk from delay. The mode of amputation becomes also a more important consideration in proportion as we advance upwards from the extreme points of the fingers and toes to the shoulder and hip-joints. In the present day the only modes of amputation in general use in the upper parts of the limbs are the double circular incision and the double flap operations. The former may be considered as having long been the favourite mode of operating in Great Britain; and to its improvement some of the English surgeons, particularly Cheselden and Alanson, devoted much attention. The flap operation, again, was long more particularly patronised by the continental surgeons. It was first, I believe, practised by M. Vermale, was subsequently recommended by La Faye in the memoirs of the French Aca-

demy of Surgery, and is well described by Le Dran. Although no one, I believe, has ventured to claim this operation as a modern invention, yet I have frequently heard it spoken of as a novelty, and it has, in my opinion, been recommended too indiscriminately. Those gentlemen who have been educated exclusively in this school, may possibly consider the following comparison between the two modes of operating as out of date. But although the advantages of the double flap operation are very generally, yet they are not universally admitted; and one who has witnessed so many revolutions in practice as I have done, would not be surprised to see the circular incision again enjoying more favour. My colleague Mr. Syme, one of the earliest advocates, and one of the most successful performers of the double flap operation in this country, now adopts a modification of the double circular incision when operating low down in the thigh.

I know of no correct estimate, upon an extensive scale, of the result of amputations performed by the circular incision and by the double flap, which will enable us to decide, by the test of experience, whether there is any material difference in the loss of patients from the two operations respectively. A valuable essay upon their respective merits was indeed produced in the class of Military Surgery here some years ago, and subsequently printed by the author, Dr. M'Hardy. I had great pleasure in assigning a prize to that essay, which is characterised by very considerable talent and indefatigable research. It contains a mine of references of great value to those engaged in the investigation of this subject, but I must be excused for saying that the writer has by no means made the most of his materials, and the conclusion to which he comes, in favour of the flap operation, rests rather upon a conjectural estimate of its comparative advantages than upon any unambiguous deduction from statistical facts. What I could wish here, as in the question of primary and secondary amputation, is to see a simple comparative statement of results upon a large scale, particularly as regards the state of the stump, giving credit to the surgeon in either case, for having performed his operations judiciously and correctly; feeling assured, as I do, from what I have seen of amputations, that although the difference between the dexterity of one operator, and the mal-

adroitness of another, will make a vast amount of difference to the patient in present suffering and in after comfort, it will not often make the difference to him between life and death.

In instituting any comparison between these operations, as usually executed, one of the first circumstances deserving attention is the extent of cut surface left by the one operation and by the other. Wishing to ascertain the relative proportions, I submitted the matter to two scientific gentlemen, the late Sir John Robison, the secretary of the Royal Society, and Mr. Scott Russell, then a lecturer on Natural Philosophy, each of whom came to the same conclusion. Supposing the limb cylindrical, and the amputation performed in the old way, by cutting at once down to the bone, and then dividing it by the saw, the cut surface exposed would be the least which it is possible to expose by any mode of operating. Supposing again that the limb is amputated by the double flap operation, and that the length of each flap is exactly equal to the breadth of its base, the quantity of cut surface exposed by this operation would be rather more than double that exposed by the former. Or, in other words, "supposing the limb to be cut represented by a cylinder three inches in diameter, then, if a direct section be made at right angles to its length, the area of the surface exposed will be 7.05 inches nearly." If the section be made, again, by two flaps of the proportions formerly mentioned, "the area of the surface exposed will be 15.5 inches nearly, being the area of an ellipsis, formed by the section of a cylinder, whose length is twice its diameter." The above, however, can only be considered as an approximation, and, I admit, a very distant approximation to the truth, inasmuch as the double circular incision exposes a larger surface than the direct transverse section of a limb, and inasmuch as some of the limbs, the thigh particularly, can scarcely be considered as a cylinder, but a gently tapering cone.

It is not, however, the extent of cut surface in itself that seems to me an objection to the flap operation, but in proportion to the extent of this surface is the number of vessels requiring ligature; in amputation of the thigh, for instance, when the operation is undertaken for long-standing disease of the knee-joint, and performed very low down, we have the flaps, particularly the extreme points of them, often highly

vascular, and it is no uncommon thing to find from eight to ten vessels requiring ligature; whereas half this number of ligatures is often sufficient in the circular operation. It will be easily understood that a vessel which requires a ligature in the lower edge of the flap may, in its progress towards it, have given off several branches, each of them requiring the same security; and many of which would have been removed along with the distal part of the limb by the circular incision. It will also be understood, that in operating by the double flap, the blood-vessels are often cut obliquely; sometimes, indeed, they may be seen scooped like a writing-pen; and although this may be of no great moment when these vessels are carefully and accurately secured with ligatures, yet this is obviously a division of the vessel unfavourable to its retraction and rapid closure; and if, in consequence of the faintness of the patient, a vessel should not bleed, and not be secured at the time of the operation, it will be more liable to bleed afterwards when the patient rallies, and the blood returns with increased impetus to the wounded point. In proof of this I would appeal to the observation of my colleagues here, where the flap operation has been almost exclusively performed for many years past; and a striking illustration of the liability of flap operations to secondary hæmorrhage has been mentioned to me by Mr. Alcock, who states that "in two cases at Vittoria of double amputation, one leg in each was amputated by flap, and another by circular incision; from the former in both patients there was secondary hæmorrhage, and from neither of the latter."

Hæmorrhage, perhaps scarcely coming under the usual description of secondary hæmorrhage, but occurring a few hours after the patient was laid in bed, was at one time with us a case of very frequent occurrence after flap operations—in fact, the practice of delaying the complete dressing of a stump for several hours after the operation, was advocated, in addition to other reasons, upon the ground of its affording a facility to meet this sort of secondary hæmorrhage. In one case, I have seen nine vessels secured upon the table, and eleven afterwards: in another, we had eight or nine vessels secured before the patient left the operating table, and the same number within an hour afterwards, in consequence of hæmorrhage from the

stump. In another case, I saw sixteen vessels secured before the patient left the table, and five afterwards in the course of the same evening. These are occurrences with which I can safely say that I was altogether unacquainted, so long as I was in the habit of seeing or performing the operation by the double circular incision. Here I merely state the fact. If any more satisfactory explanation can be given of it than what I have offered, I am quite ready to adopt it.

The state of the nerves in flap operations is another important consideration. The remark I have made as to the ramifications of the arteries, will in some measure apply to the nerves. We sometimes see large portions of nerves exposed upon the surface of the flap, or projecting loosely from it, and this to such an extent as to suggest the necessity of their removal by the scalpel or scissors, which I have more than once seen. In one or two cases, I have observed slight neuralgic affections succeeding to flap operations, and again gradually subsiding. This, I am inclined to think, may be owing to some of those exposed filaments of nerves being brought over the sharp edge of the newly cut bone, and this source of irritation becoming lessened as the abrupt edge of the bone is rounded off. In other cases more severe and permanent, neuralgic affections have been obviously induced by the long-cut nerves becoming involved in the cicatrix, and there forming neuromatic tumours; and of such neuralgic stumps I have seen several after flap amputations, as well as after those by the double circular incision.

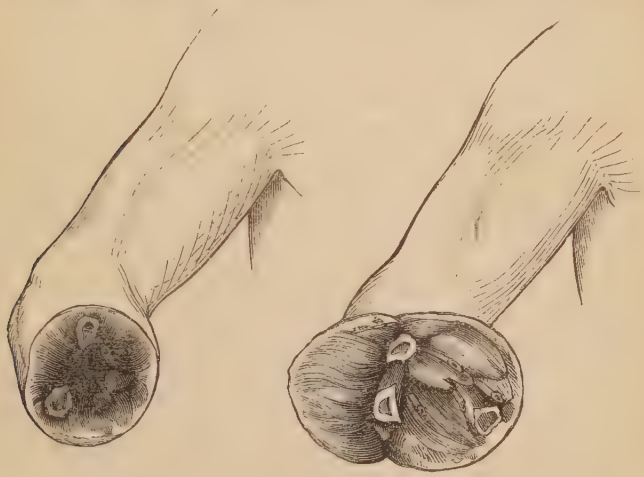
The next point of view in which the two operations may be compared, is the covering left for the extremity of the bone and the favourable state of the parts for an accurate approximation and speedy healing of the wound. In both these respects, the comparison is highly in favour of the flap operation, according to the views entertained, and the practice followed by the surgeons of this country. This involves, also, the important question of the period of cure, and future utility of the stump—points upon which accurate statistical information is highly desirable. I am not an advocate for the long flaps sometimes formed, and left hanging pendulous from the extremity of the bone, but think that better stumps are made by shorter flaps, retracting or separating the soft parts a little

upwards, so as to enable the saw to be applied somewhat higher than the point of transfixion.

Facility and rapidity of execution is seldom a fair ground of preference for one operation over another, and can never be so when other important considerations are to be sacrificed to them. It is indeed possible to conceive cases, particularly in military or naval life, where, *cæteris paribus*, the saving of time may be an object; but the rapidity with which the flap operation can be executed, has, I fear, been sometimes made a ground of preference where no such motive existed; and I cannot divest myself of the suspicion that the feeling of rivalry has in some measure led to the indiscriminate practice of flap operations. It is not every young surgeon who can stand by undisturbed and hear it said, and hear it repeated, that his colleague will amputate a limb in so many seconds, while he requires perhaps as many minutes. The flap operation is a seductive one, and I speak from my own experience when I say, that it is an operation which one is unwilling to relinquish after having once experienced the comparative facility and rapidity of its execution. It will be seen, however, that I am quite prepared to discriminate between those cases in which the flap is to be considered the preferable operation, and those in which the circular incision is the best. I may here state generally, that in operating at the joints, the adoption of the flap operation is calculated to facilitate the disarticulation of the bone; and in coming to particulars I would specify the shoulder and hip-joints, the fore-arm, and the leg, as cases in which this operation is decidedly preferable, but I am not prepared to admit its exclusive advantages in operating on the arm, or on the thigh. These seem to me the principal points of importance in a general comparison of the two operations; and others will hereafter be noticed, as they apply to particular parts of the limbs.

I have ventured to repeat the foregoing statements in the present edition, notwithstanding the good-humoured way in which they were criticised by my talented friend, and former colleague, Mr. Liston, than whom there is certainly no surgeon of the present day, or of any other, for whose professional opinions I entertain a greater respect. I shall not offend the memory of my late friend Sir John Robison, by presuming

to add anything in support of a mathematical proposition to which he has set his name. But Mr. Liston has taken pains to show that my comparative estimate of the extent of cut surface by the two operations—an approximation to the mathematical truth—is altogether incorrect, and that the larger cut surface is left by the circular incision. That it is quite possible to amputate so as to give the appearance figured by Mr. Liston for the special purpose of explaining his views, I am ready to admit. But it is also quite possible to amputate so as to represent the two operations thus, as



figured by Maingault, without any reference to the point in question. Mr. Liston's figures do not represent correctly this operation as I have usually seen it executed; but they show very distinctly that in proportion as we magnify the extent of cut surface by a double, triple, or quadruple section of the skin and muscles, carefully retracting the superficial parts at each succeeding step, so do we obtain the principal advantage of the double flap operation—a complete covering for the bone—while at the same time we obtain a more favourable division of the blood-vessels and nerves.

Mr. Liston has erred in two points. He has set me up as the advocate of the double circular incision—an operation for which I have no general nor exclusive partiality, and which I have never performed since I became familiar with

the other. Again, he has spoken of my observations on the extent of cut surface as my principal objection to the double flap—a point which, when compared, as I have done, with the advantages it gives in a covering for the bone, and in a favourable adaptation of the parts for immediate reunion, can scarcely be considered an objection at all, or at least one of much less importance than the unfavourable division of the blood-vessels and nerves. Having seen and practised the one operation exclusively in the earlier part of my professional life, now extending to almost fifty years, and having performed or witnessed, with few exceptions, the flap operation for many years past, I think myself in a position to make a few impartial remarks on their comparative merits, as I have seen them generally executed. I made these remarks, in the first instance, without attaching to them anything like the importance which has been attached to them by others. I entertain for them no special nor paternal affection, and had it not been for my respect for the quarter whence the criticism has come, I should not have been tempted to say even this much in their defence.

In amputating the fingers, when a portion of the phalanx is left protruding after a wound, one is sometimes induced to cut it across with the cutting pliers or metacarpal saw, but whenever the amputation of a finger falls to be performed methodically, this is now, I believe, uniformly done at the junction of the different phalanges with each other. It is most advantageously done by two flaps, the larger formed from the internal or palmar aspect of the finger, as is well represented in Maingault's "Traité des diverses Amputations." When the proximal phalanx is to be removed from its junction with the metacarpal bone, it is best done by two lateral flaps, as figured in the same work. The partial amputations of the metacarpus are regulated by the peculiar nature of the accident or disease; and, so far as verbal description can render them intelligible, they are well explained by Mr. Guthrie.

Amputation at the wrist-joint is an operation which I have never practised, except on the dead body; and, looking to the extent of bony surface which must be exposed, and to the scanty and tendinous character of the covering left for it, one

would be inclined to say, *a priori*, that this was an operation which ought seldom or never to be practised. I have seen it, however, successfully performed upon more than one occasion. An interesting case of this operation was transmitted to me several years ago by Dr. Davies, surgeon to the Honourable East India Company's Depôt at Chatham, who concludes his account of the case with the following judicious remarks:— "The gentleman, who is an engineer officer in the East India Company's service, and a very clever youth, had so well educated his left hand before he got the artificial hand made, that he could write and draw plans with it as neat, probably neater, than he could with the right before he lost it. He has consequently neglected the artificial hand, and has not made that use of it that I was desirous he should have done, and in which I am a little disappointed. But the full length of the right fore-arm enables him, without the artificial hand, to assist the left hand so effectually in the adjustment of his drawings and papers, that probably he will never make much use of it, except at table, and a knife or fork being easily fixed on, it will become serviceable in the management of his plate. Here is an advantage in the length of the lever that I did not anticipate. A short stump would have been of little service in the management of papers; and as an artificial hand cannot by any ingenuity be made serviceable without a stiff leather case, somewhat heavy, being fastened on the arm, the ability to dispense with this apparatus, especially in a warm climate, is in itself no small gain."

Amputation of the fore-arm is a case in which the double flap operation appears to me peculiarly applicable, and the following remarks are suggested by circumstances actually arising in practice. I may here state an inconvenience which I once witnessed from the performance of the operation by the double circular incision in this part of the arm. In the case alluded to, where the arm was brawny, and the bellies of the muscles very full immediately below the elbow, the skin, when divided by the first turn of the knife, could not be easily drawn upwards over the subjacent muscles, it formed a stricture upon them as the prepuce does upon the glans in a case of phymosis, and was with difficulty retracted sufficiently to form a covering for the surface of the stump. With reference

to a case of flap amputation, I have elsewhere observed, in a clinical lecture, that, "although the patient's recovery was rapid, and the stump in every respect a good one, yet the consideration of this case gave rise to a remark for which I am entirely indebted to the late Dr. Lubbock of Norwich, and which I consider well entitled to attention. In a case like the present, where the tendons have been torn through, or disengaged at their distal extremities, and where the amputation is performed by transfixing the limb with a catline and cutting outwards, the tendons, from the resistance which they give to the edge of the knife, are in some measure drawn upwards, and are thus cut longer and less smoothly than is desirable;" this remark will obviously apply more forcibly as we come farther down in the fore-arm, the tendons being here cut with more difficulty, and less intimately connected by cellular adhesions.

Although favourable to the double flap operation in a large proportion of cases, yet I am not an advocate for its indiscriminate use, and I am desirous that none of its occasional inconveniences should escape notice, in order that we may be prepared to avoid them. In the case specified above, the simple expedient of making an assistant grasp the wrist firmly will I think enable us to do so. With reference to another case, I find the following remarks:—"This case I am induced to mention, not from any very instructive lesson to be gathered from its progress, much less from any thing very unexpected in its event, but to caution you against an accident which occurred during the operation. While passing the knife through the fore-arm, from the radial to the ulnar side, for the purpose of forming a posterior flap from the extensor and supinator muscles, its point slipped between the bones, which rendered it necessary to withdraw it a little, and to pass it more carefully behind the ulna. This was perhaps owing partly to my own inadvertence to the exact position of the bones, but in part also I believe to the connection between the lower extremities of the radius and ulna having been broken up, so that in pressing the knife close to the back of the radius, with the view of obtaining a sufficiency of muscular substance to form a good flap, the parallelism of the two bones was destroyed, the radius was pressed forwards, and the interosseous space thus presented to the point of the knife."

Amputation in the region of the humerus is an operation upon which many valuable remarks are to be found in the writings of Mr. Guthrie and other military surgeons. It is one of those cases in which, generally speaking, the mode of operating, whether by the circular incision or double flap, may fairly be made a matter of choice. For a number of years past I have been in the habit of performing and seeing my colleagues perform this operation almost exclusively by flaps, and the general result of these cases does not suggest any great objection to this mode of operating; but I may remark, that when this amputation is made at or near to the insertion of the deltoid muscle, and the flaps formed by passing the catline perpendicularly through the arm, the bone is left very scantily covered in one direction, and in such a case I have seen it with great difficulty prevented from protruding between the flaps.

In all the amputations hitherto noticed, the surgeon may have recourse to a tourniquet for the purpose of suppressing the hæmorrhage during the operation, and it may be observed, that it is in amputations of the inferior part of the limb, chiefly in the fore-arm and leg, that the tourniquet becomes most useful. In the superior parts of the limbs, when the whole of the blood is concentrated in one channel, and when there is only one vessel of importance to tie, the hæmorrhage may readily be commanded by an assistant, during the momentary space of time requisite for this purpose; but in the more distant parts of the extremities, when the blood flows through several nearly equal-sized vessels, the hands of an assistant are liable to become fatigued before these can be all secured, particularly if he exhausts himself, as an inexperienced assistant often does, by pressing too soon, or with an unnecessary degree of force. In noticing the application of the tourniquet during amputation, it may be necessary to caution the young surgeon against the use of too large a pad, the objections to which are well stated by Mr. Copland Hutchison, who gives an account of an embarrassing accident which occurred to himself, and refers to a fatal one which happened to Mr. Guthrie from this cause. "A principal objection to the placing of a large pad over the artery is, that the web of the tourniquet passing over a surface so much elevated above the cir-

cumference of the thigh, a considerable angular space on each side of the pad will be left slightly, or not at all compressed by the circular band of the tourniquet, however closely the instrument may be screwed. This will not only endanger the loss of a large portion of blood, from the divided ends of such vessels as may happen to traverse that space—a circumstance to be particularly guarded against in cases of debility —but the emission of blood must also embarrass the young surgeon in the subsequent parts of the operation."

Amputation at the shoulder-joint.—Although this operation has undergone many modifications, to some of which the names of Morand, La Faye, Le Dran, Larrey, Lisfranc, Broomfield, Alanson, and others, have been attached, yet these may all be resolved into two modes of proceeding, either by forming a superior and inferior, or an anterior and posterior flap. I have myself operated once in the former, and twice in the latter way, but this is not sufficient to enable me to institute any fair comparison as to the best mode of proceeding. I may, however, be permitted to remark, that in a very large proportion of the cases requiring primary amputation at the shoulder-joint, the soft parts are so lacerated as to leave us no choice, but to compel us to form the flaps as circumstances will best admit. We are now well aware that the apprehension of an uncontrollable hæmorrhage, which alarmed our predecessors, and made them slow to adopt this operation, is altogether unfounded. In the old mode of proceeding, the bleeding may always be controlled by firm pressure above the clavicle, by the hands of a steady assistant; and, in fact, this compression, as my distinguished predecessor Dr. Thomson observes, has been found "easier in practice than it appeared to be in speculation." It is necessary, however, to remark, that at the moment of cutting through the axillary vessels and nerves, the patient is apt to give an involuntary start, and may throw the fingers of the assistant off the artery; an accident which once happened to a gentleman assisting me in this operation, and by which I nearly lost my patient. I was for a moment completely blinded by the discharge of blood into my eyes from the open axillary artery.

The general result of amputations at the shoulder-joint, particularly of primary amputation, is highly satisfactory, and

may here be stated as an encouragement to this operation. Mr. Guthrie, we find, performed this amputation in all fourteen times while serving with the army, and although some of his patients, from unfavourable circumstances, did not recover, yet he states that in one of them only could the fatal event be attributed to the operation. He considers it to be less dangerous than amputation of the thigh—a statement in which my own experience of the result of numerous cases, both in my own hands and those of others, leads me to concur. Of nineteen cases of primary amputation at the shoulder-joint, in the army under the Duke of Wellington, from June to December 1814, sixteen recovered, two were transferred to distant hospitals, but considered out of danger, and only one died. Mr. Alcock's experience gives one death in nine amputations at this joint, and in the French army the results have been equally satisfactory. Baron Larrey performed this operation in sixteen cases during the Egyptian campaign, and of these he lost but two. After the battles of Wagram and of Essling, out of fourteen cases he lost but two. A similar train of success seems to have attended this operation in his hands on other occasions, and it is stated generally, that in the French army 90 out of 100 have recovered. We have now several instances recorded of the successful removal of the scapula along with the arm, of which I saw an interesting case in the hands of my former colleague Mr. Fergusson, at King's College Hospital.

Amputations of the toes are almost uniformly performed at their junction with the metatarsal bones, and here they are best done, as in the fingers, by two lateral and equal flaps.

Partial amputation of the foot at the junction of the metatarsal bones with those of the tarsus, or through the tarsus itself, immediately in front of the astragalus and os calcis, are operations often successfully performed. So far as these can be rendered intelligible by description alone, Mr. Guthrie's observations upon this subject leave nothing to be desired, and Maingault's plates, which I am in the habit of exhibiting to my pupils when performing these operations on the dead body, contribute much to a right understanding of the various modifications of amputation which may here be practised. With reference to the operation through the tarsus, or what

is termed Chopart's operation, the utility of which has sometimes been questioned, I may state from my own observation, that in two cases where I have seen this operation performed, the results have been most satisfactory.

Amputation at the ankle-joint.—This is an operation with which I have only of late become familiar. It was introduced here in 1842 by my colleague, Mr. Syme, who states, in a valuable paper in the third volume of the "London and Edinburgh Monthly Journal of Medical Science," the views which led him to adopt the operation, and the advantages to be derived from it. Since that period, I have repeatedly seen the operation performed by Mr. Syme and by my other colleagues in the Royal Infirmary. It is best executed, when circumstances admit, by a transverse incision across the upper surface of the foot, from one malleolus to the other, a little in front of the joint, and with a slight convexity forwards; another similar incision is then made between the same points through the sole of the foot, the ankle disarticulated, and the calcaneum dissected out from the dense integuments with which it is covered. By the kindness of my late colleague Dr. Mackenzie, I was enabled to introduce into the last edition of this work the woodcuts illustrative of a case recorded by him in the Monthly Journal of Medical Science for August 1849, in which he was induced to perform this amputation by lateral flaps, and to which I think it right to refer my pupils, as illustrative of a principle which cannot be too frequently pressed upon the attention of military surgeons —the necessity of modifying their operations according to the circumstances of the case. Dr. Mackenzie, with a candour which does him much credit, in reference to his operation as compared with Mr. Syme's, observes, that "it is no longer found necessary to carry the incision across the sole so far forwards as at first practised;" and "I believe," says he, "that the incisions now recommended and practised by Mr. Syme will, in the majority of cases, be found best calculated to ensure the formation of a good and useful stump." There are not, perhaps, many cases of gunshot wounds likely to occur in which amputation at the ankle would be indicated, or, from the state of the parts, would be advantageously performed; but I am fully satisfied of its utility in many

cases as a secondary operation, and this rather against my original prepossessions.

In amputating the leg between the knee and ankle-joints, the operation which I have almost exclusively seen and practised for many years past is that of Loudham and Verduin, a complete account of which is given in Massuet's Treatise "De l'Amputation à lambeau." In this operation a large flap, sufficient to cover the extremities of the bones, is formed from the muscles on the posterior surface of the leg. Here it must be observed, that in a very brawny limb, or in amputating high up towards the knee, it is necessary to guard against a superfluity of muscle, either by cutting from without inwards and retracting the skin before forming the muscular flap, or by passing the catline through the limb at some distance behind the bones, so as to exclude a portion of the muscular substance from the flap, leaving it to be afterwards divided by a circular turn of the knife. In this amputation the flap does not meet a corresponding flap from the opposite side of the limb, but the muscular substance is turned completely round the extremity of the bone; and it will be observed that every exterior layer of muscular substance has to form an arc of a larger circle than the one immediately within, while the integuments, in order to cover the subjacent muscle, must form an arc of a circle of still larger diameter. This leads me to observe, that this operation is, for the most part, executed more neatly and successfully when performed as a secondary amputation in a limb shrunk and wasted from previous disease, than as a primary amputation in consequence of an accident. In a case of the latter kind, I once saw the muscular substance so redundant, that the integuments were with great difficulty brought to cover it; the stricture was so great that the stump rapidly sloughed and the patient died. This is indeed but one of many cases in which I have seen bad consequences from a superfluity of muscle, both in the single and double flap operation. This amputation below the knee was, in former times, frequently performed by the circular incision, and there is also a third mode of operating by two lateral flaps, which, it appears, was long shown by Mr. Brookes in his courses of lectures, and of which I am in possession of a minute detail, in a letter from Mr. Brookes to Mr. Copland Hutchison, written at my request

many years ago. But as I consider the single flap operation, when carefully executed, to be the most eligible mode of amputating the leg, it seems unnecessary to enter into the subject farther in this outline. These observations apply more particularly to amputations a few inches below the knee-joint. With reference to amputations lower down in the leg, I think it right to apprise my readers of the following fact:—Of thirty-four soldiers admitted into the Hotel des Invalides after the Russian campaign, with their legs amputated immediately above the ankle, twenty-two had such bad stumps as to induce them to submit to a second amputation below the knee.

Amputation of the thigh.—The general remarks which were made in regard to the two most common modes of operating in the removal of limbs, may be considered as more peculiarly applicable to this operation, and it is one of the cases in which we see either operation frequently executed with success; it is one of those cases in which the surgeon will be very much guided by his general estimate of their respective advantages; and it may be remarked that in no other instance is the facility and rapidity with which the flap operation may be executed more conspicuous than here. Indeed the rapidity with which this operation is frequently performed, is sometimes alleged as an objection to it; but this is an objection in which I am not disposed to concur; for although the maxim, "*sat cito si sat bene*," is an excellent one in surgery, yet we may say with equal truth, that if an operation is well done, it can scarcely be done too quickly—a sentiment in which the patient will always acquiesce. The only points upon which it seems necessary to remark particularly, in reference to amputations of the thigh, are the mode of forming the flaps, and of dressing the stump after the circular operation, and both these points I have noticed in the following extract from a clinical lecture:—"You would observe, gentlemen, that in amputating this young woman's thigh, instead of forming two lateral flaps, as I had hitherto been accustomed to do, I formed an anterior and posterior flap, the one from the extensors on the fore part, and the other from the flexors on the back part of the thigh.

This is a mode of operating which I first saw practised by Mr. Liston in the cases of two boys operated upon in our Infirmary here; and in the case of such young subjects who cannot

readily be made to retain their stumps in a desirable position, but are constantly inclined to elevate the point of the stump, it appears to me to offer decided advantages. In the first place, it obviates the projection of the bone between the lateral flaps, which I am told has sometimes occurred; and in the next place, you will see that the more the point of the stump is elevated, the more are the extensor muscles relaxed, so as to afford a covering for the point of the bone." Other collateral advantages attendant upon this mode of forming the flaps are pointed out in a paper of Mr. Creaser's, formerly of the Bath Infirmary, in the twenty-second volume of the Edinburgh Medical and Surgical Journal; although he indeed recommends the flap to be formed by cutting from the surface towards the bone, instead of transfixing the limb and cutting outwards. The plan of dressing stumps after the common circular amputation of the thigh, so as to place the line of the cicatrix transversely instead of perpendicularly, you will find advocated both by Mr. Guthrie and Mr. Copland Hutchison, the latter of whom, in the first edition of his surgical work, gave a marginal sketch well calculated to illustrate his valuable remarks upon this point.

Amputation at the hip-joint is an operation which can never be contemplated with very sanguine hopes of success, but which it has nevertheless frequently become the duty of military surgeons to undertake, and from which we have now many instances of recovery. The particular cases requiring this operation are specified in numerous works; and I cannot help observing that some of these are cases in which the less formidable operation of excision of the head of the femur might perhaps be substituted with advantage. This would seem to me to apply particularly to cases of the following description, pointed out by my predecessor Dr. Thomson, as cases for primary amputation:—"The kind of wound for which immediate amputation at the hip-joint appears to me to be best adapted, is one in which it has not, so far as I know, been practised or recommended. I allude to that in which a musket-bullet or grape-shot, or a small portion of shell, has been observed to fracture the neck of the thigh-bone, or to fracture the head of that bone, and pass through or lodge in the hip-joint. The proportion of cures which has

been obtained from amputation at the hip-joint is, I believe, much greater than of cures from gunshot fractures of the head or neck of the thigh-bone. Indeed, of recoveries from these injuries I know of none which have been recorded. Those who, for a time, seem to do well, in the end sink under the hectic which supervenes. This has been the fate, I believe, of the two cases which I have mentioned in the account of injuries of the hip-joint as having put on a favourable appearance. It seems therefore highly probable, that in the fractures by musket-bullets of the neck and head of the thigh-bone, the practice of amputation at the hip-joint will become the means of saving many lives; and we cannot but expect that the results from amputation, in these cases, will be found much more successful than in the class of cases in which it has hitherto been employed, since the local and constitutional injuries at first occasioned by musket-bullets are comparatively small with those which occur in the more severe wounds produced by cannon-shot."

In all the amputations of the inferior extremity which I have hitherto noticed, the main artery of the limb may, as in the superior extremity, either be compressed by the hand of an assistant, or the hæmorrhage may be commanded by the tourniquet; but, in amputating at the hip-joint, this instrument is inapplicable, and in originally contemplating this operation, the fear of incontrollable hæmorrhage was one of the objections chiefly dwelt upon. It does not fall within my present plan to detail all the methods of operating which have been devised with a view of obviating hæmorrhage, for, of all the amputations, this is the one in which the circumstances of the case must determine the mode of operating. Like all the other amputations at the joints, it appears to me to be best performed as a flap operation; and it is a great advantage of the mode which I would recommend, that, while it seems the most eligible mode of forming the flaps, it is also, perhaps, the most effectual mode of commanding the hæmorrhage.

Let the limb be transfixed with one of the long amputating knives, entered on the outside of the joint, and carried transversely across in front of the bone; an anterior flap is then to be formed from the muscular substance in the forepart of the thigh, and as the knife advances downwards, the

fingers of an assistant are gradually introduced into the incision behind it, so that he obtains a perfect command of the femoral artery previous to its division; the limb being then forcibly abducted and pressed downwards, the capsular and round ligaments are cut, and the amputation completed by dividing the parts behind the joint. The command of the femoral artery is in this way perfect; and the better plan is not to lose time in tying this vessel until the arteries in the posterior flap are secured. The anterior flap may either be made of proper dimensions to meet a corresponding flap from behind, or the anterior flap may be prolonged so as to cover the whole face of the stump, the parts behind being cut perpendicularly backwards. In this way I have three times seen amputation at the hip-joint performed on the living body, and it appears to me scarcely susceptible of improvement.

OPHTHALMIA.

Ophthalmia is, in my estimation, one of the most important subjects to which the attention of a military surgeon can be directed; and that I do not overrate its importance to the military profession and to the public at large, will appear from the following statement. In an excellent publication on this disease by Dr. Vetch, formerly of the 52d regiment, he states, that in the second battalion of this regiment, consisting of about 700 men, 636 cases of ophthalmia were admitted into the regimental hospital between August 1805 and August 1806, of which number fifty were dismissed with the loss of both eyes, and forty with that of one; and it appears from the returns of Chelsea and Kilmainham hospitals, that on the 1st of December 1810—that is, in little more than five years from the appearance of the disease in the 52d regiment, the number of soldiers who were a burden on the public, from blindness occasioned by ophthalmia, was 2317. With reference to our own service, it is also stated more recently in the Statistical Reports, to which I always refer with confidence, that in the Windward and Leeward Islands, "Diseases of the eyes are a

source of considerable inefficiency in this Command, being nearly five times as common as among troops at home, but this is the case in a greater or less degree in all warm climates." In the Belgian army ophthalmia has of late been exceedingly prevalent, and so late as 1834, we find, from a paper in the United Service Journal, that in the Russian army 8000 men were afflicted with this disease. The loss of men which armies occasionally sustain from fever and from dysentery, a temporary privation of the services of numbers from venereal complaints, from ulcers, and from accidents, are occurrences with which military practitioners have long been familiar; but few of these have ever been such a source of regret to commanding officers, or of vexation and disappointment to surgeons as that form of ophthalmia which, for a series of years, rendered whole regiments occasionally ineffective, and entailed an unheard-of expense on the country.

The term ophthalmia is employed by medical writers to denote inflammation of the eye, originating from whatever cause, while it may be observed, that amongst non-professional people, the word ophthalmia is thought to imply a disease of a peculiar and specific nature. The term Egyptian ophthalmia has been still more circumscribed in its application, and has been thought to imply a disease *sui generis*, different from every other inflammation of the eye. This is an application of the term little calculated to impress us with correct opinions of its nature or treatment; and medical men have ceased to consider the Egyptian ophthalmia as possessing anything peculiar in its nature, or demanding any specific mode of treatment—the only difference recognised being its extreme violence and difficulty of cure. The disease has, perhaps, in all ages been familiar to the inhabitants of warm countries, while the happy exemption of the northern parts of Europe from the more aggravated forms of ophthalmia, rendered us till of late little conscious of their existence.

Although ever since the return of the troops from Egypt in 1801 and 1802, the disease occasionally prevailed to a limited extent, chiefly in those regiments which had served there, it was not until 1805 that it appeared in such a form as to give general alarm, and this not in an old corps which had served abroad, but in the second battalion of the 52d regiment

—a battalion recently embodied, and at that time quartered in the barracks at Hythe in Kent. The leading circumstances attending the propagation of the disease in this regiment, as given by Dr. Vetch, are interesting, not only from their individual importance, but as affording grounds for more general deductions. This battalion was formed at Banbury in Oxfordshire, by a draft of a few officers and privates from the first battalion in the end of 1804, and soon afterwards marched to the barracks at Hythe, where, on the 9th of June 1805, it was joined by about five hundred volunteers from the Irish militia.

The regiment continued tolerably healthy, making allowance for the increased number of diseases from dissipation, always to be expected in a newly-raised corps. Excepting a large proportion of venereal cases, no particular distemper prevailed, when the first case of ophthalmia made its appearance on the 14th of July and about the middle of August five others suddenly appeared. These cases did not attract attention, as presenting anything different from those arising from the usual exciting causes, except the little benefit which they derived from the common modes of treatment, and the length of time to which they were protracted. On the 30th of the same month, the first case in which the disease proved violent was admitted, after which it spread rapidly, every day adding fresh numbers to the list. "An explanation of the causes of the disease was first sought for in the situation of the barracks at Hythe, on the most easterly point of the extensive marsh of Romney. The coast in the neighbourhood is covered for miles with a dry white shingle intermixed with finer particles of sand, in front of which the men were in general paraded. From the hot season of the year at which the disease made its appearance, from the exercise which the men daily underwent, exposed to the reflection of the sun's rays from the shingle, and the great quantity of fine sand which a long prevalence of blowing weather carried from it, a ready explanation of the origin of the disease seemed to present itself. Had the affection proved general among the troops then stationed under the same or nearly under the same circumstances, those causes, which were at the time very generally complained of, would probably for a while have set aside all farther inquiry. This, however, was not the case, for the first battalion of the

same regiment encamped at a little distance, the 43d regiment, and the Lincolnshire Militia, who were quartered in the same barracks with the second battalion of the 52d, remained free from any participation in the complaint. Upon inquiry it was discovered that many of the Irish recruits had volunteered into the 52d from regiments in which the disease had prevailed, and had themselves been affected with it, though in its milder form. The general testimony agrees, that those regiments received the ophthalmia from being garrisoned along with others which had suffered from it in Egypt and the Mediterranean. Upon particular inquiry I found that the men in whom the disease first showed itself in the 52d had formerly been afflicted with it in Ireland; and we shall hereafter have occasion to observe, that one of the most unfortunate effects of the disease is the tendency which it leaves to a relapse on the application of any irritating cause, so that the origin of the complaint in this battalion receives the most satisfactory explanation from the combination of the abovementioned circumstances. The present and every other instance of the occurrence of the disease at a distance from the country in which it has taken its rise, affords undisputed proofs of its powers of self-propagation."

Here Dr. Vetch broaches a question of the contagious nature of the disease, upon which it is necessary to make a few observations before proceeding to an account of its appearances and modes of treatment. This subject had previously been fully entered into by Dr. Edmonstone, in his Treatise on Ophthalmia, published here in 1806. He refers to Aristotle and several other ancient writers, from whom passages have been selected, tending to prove that the disease has from very remote times been looked upon as contagious. Some of these passages, however, seem rather to prove too much. as for instance the following expression of Boerhaave :—"Si quis subito videat hominem cujus limbi palpebrarum sunt inflammati, coccinnio colore fulgentes, et oculi simul tales sunt, et lachrymæ inde distillant, *ejus oculi etiam inde lædantur*." Here it is obvious that the author, writing *De Sympathia*, adduces this as a proof not of contagion, but of the powers of sympathy—a source of the disease which will not be considered very extensive in its operation.

In recent times, one of the first authors to notice the contagious nature of this disease was Dr. James Armstrong, who, in a thesis published here in 1789, De Tuenda Nautarum Sanitate, gives a history of a severe ophthalmia, which broke out in his majesty's ship Albemarle, while cruising on the coast of Hispaniola, in January 1782. Its origin was attributed to the impressment of three seamen labouring under the disease from on board a slave-ship; "each of these men," says Dr. Armstrong, "laboured under a slight inflammation of their eyes, and when questioned as to the cause of this affection, said that they were then convalescent from a very severe disease, under which almost the whole of the men on board the slave-ship laboured, and from an attack of which none except the master of the vessel had escaped. On the fourth day after these men were brought on board the king's ship, two of the seamen originally belonging to her complained that they had been seized during the preceding night with severe headach, and were at the same time affected with a troublesome sensation in the eyes, as if dust had been sprinkled into them. On the following morning several others said that they had been seized with the same complaints during the previous night, and, on the morning of the seventh day from the appearance of the disease, two-and-twenty men were rendered unfit for duty by it. Some of them were confined to bed, and unable to raise their heads from the pillow, and the inflammation increased so much that their eyes resembled raw flesh. The disease increasing so rapidly, it was judged necessary to prohibit all communication between the sound and the infected, which being done, the contagion affected no more than twenty-five; and in about five weeks from its first appearance in the ship, altogether disappeared."

The foregoing very interesting account appears to have attracted no general notice, and until the ophthalmia occurred in the second regiment of Argyleshire Fencibles in the spring of 1802, and fell under the accurate observation of their surgeon, Dr. Edmonstone, we have but little account of the appearance of the disease, and no documents calculated to establish the opinion of its contagious nature. Dr. Edmonstone endeavours to explain the possibility of ophthalmia being propagated by some subtile effluvia, either from the system,

or from the eye of the patient; but at the same time admits the very contagious nature of the purulent discharge from the conjunctiva, and to this source other writers about the same period attribute the rapid spread of this disease. We have already seen that Dr. Vetch is convinced of the contagious nature of the ophthalmia which occurred in the 52d regiment, and to his testimony is to be added that of Mr. Peach, the surgeon of the same battalion. The late Sir Charles Forbes, formerly surgeon of the Royals, has also given his testimony to the same effect, in a paper contained in the third volume of the Edinburgh Medical Journal.

The opinion of its contagious nature has indeed been so generally prevalent amongst the medical officers of the British army, that it were endless to cite authorities on the subject; and so well convinced have the Medical Boards and the senior officers of the department been of the disease being chiefly propagated in this way, that wherever it has once made its appearance, the most vigorous measures of seclusion have been enforced. There are, indeed, very few of the British medical officers who affect to doubt it. The late Mr. Mackesey, however, of the 62d regiment, being doubtful of the contagious nature of ophthalmia, applied to his own eyes rags soaked in the discharge from the eyes of patients affected with the disease, and in this instance without any injurious effect. A particular account of this experiment will be found in the twelfth volume of the Edinburgh Medical Journal. Mr. Mackesey very candidly admits, that a single experiment of this kind is totally insufficient to establish a point of so much practical importance, and his experiment is completely neutralised by one stated to me by Deputy-Inspector Marshall, who observes—"I applied a portion of the purulent matter which was obtained from a man labouring under epidemic ophthalmia in the 89th regiment, to the eyes of four persons, including myself, and the disease followed in two of the individuals."

Amongst the opinions in favour of the non-contagious nature of the disease is to be reckoned that of Baron Larrey, who, I believe, ridiculed the idea of the disease being propagated by contagion. It is doubtful, however, whether the Baron had ever seen the disease under those circumstances

which have so generally impressed the British surgeons with an opinion of its contagious nature. We may observe that it was not in Egypt where many causes exist calculated to produce the disease, that the opinion of its contagious character was chiefly impressed upon the medical men of this country. Although many French soldiers who escaped the disease in Egypt were suddenly struck blind on returning home, yet this is expressly stated by Baron Larrey to have arisen, in his opinion, from "a paralysis of the organ of vision, induced by a sudden change from the hot climate of Egypt to that of France in the coldest season of the year;" and we have no account, so far as I know, of its subsequent occurrence in the French army in such a shape as to cause general alarm, or to invalid almost whole regiments, as it has unfortunately done in the British service. But it may be observed, that throughout this discussion I have uniformly employed the word "contagion;" and wish it to be understood according to its strict etymology, implying a disease only to be communicated by the actual contact of morbid matter, and not capable of being propagated through the medium of a diseased atmosphere.

Exclusive of contagion, the troops serving in Egypt were exposed to many causes productive of ophthalmia. The excess of heat and light, an atmosphere loaded with particles of sand raised by the wind and forced against the eyes; the alternate exposure to these agents during the day, and to heavy dews during the night, form a combination of circumstances acting both as predisposing and exciting causes. How far the excess of heat and of light are calculated to operate injuriously upon the eyes, every one must be sensible from his own experience; and it is unnecessary to enter into any laboured refutation of the opinion of some writers who deny their agency. It must however be admitted, that in order to account for the extreme prevalence of this complaint both in the English and French armies employed in Egypt, as well as amongst the natives of the place, other causes must have operated. Savary, who contends for the general salubrity of the climate of Egypt, observes, that disorders of the eyes are the most prevalent complaints amongst the Egyptians, and that the number of blind from this cause is immense. In his time, the great mosque at Cairo alone contained eight thousand miserable victims of

the disease; and Dr. Cummin, from recent observation, calculates that 20 per cent of the population at Cairo is either wholly or partially blind from ophthalmia.

The hot winds of Egypt, loaded at particular times with particles of dust, have been considered as a very powerful cause of ophthalmia; but Assalini, who accompanied the French army to Egypt, argues against the operation of this dusty atmosphere as a principal cause of the disease, and observes, "that if the dust or the sand of the soil of Egypt were the cause of ophthalmia, this malady would not cease to attack the inhabitants during the whole course of the year with the same force, since a day scarcely passes in which they are not obliged to walk in a thick mist, or in whirlwinds of dust;" and he goes on to remark, that it was chiefly during the inundation of the Nile that a great number of French soldiers were affected with ophthalmia, when the dust and sand were under water. "Notwithstanding this," says he, "I do not pretend to say that the dust from the soil of Egypt is not injurious to the eyes, but I think it alone is not sufficient to produce ophthalmia, and it seems to me more just to attribute this malady to suppressed perspiration, which often occurs in Egypt during the night, and throwing itself upon the part most weakened, affects sometimes the intestines, but oftener the eyes, fatigued by the too vivid light of the sun." This, in the opinion of Assalini, is the true source of Egyptian ophthalmia, and in the section of Dr. Vetch's practical treatise on Diseases of the Eye, published in 1820, which treats on Catarrhal Ophthalmia arising from climate and atmospheric changes, we find some interesting observations tending to show the extensive influence of heat and moisture as causes of ophthalmia. "My own observation," says he, "agrees with the testimony of most writers, that although a humid state of the atmosphere is that which proves most productive of ophthalmia, it is rather when combined with a certain degree of heat than with the cold of winter." Wherever we have heat and moisture operating generally as predisposing causes of disease, we have for the most part an excess of light affecting the eyes. In tropical climates the intensity of the light is at all times offensive to the eyes, while in more temperate climates the warmest days are also the longest, so that during this season of the year, whether

moist or not, the eye is longer exposed to the effect of a brilliant light, and what this wants in force is made up by its longer continuance.

No one who has paid attention to this subject will, I think, be disposed to question the extensive influence of atmospheric causes as influencing the production, aggravation, or relapse, in cases of ophthalmia. No more remarkable proof of this can be adduced than the following statement given by Sir David Stewart of an occurrence which took place in the 78th regiment while under his command, at Little Hampton in Sussex. The Inspector of Hospitals in going round his district, arrived one morning at the barracks of the 78th, after a field day, the wind having come round to the north-east when the men were in the field. He was astonished to find upwards of 200 men "labouring under an apparently virulent ophthalmia, with yellow matter discharging from their eyes." The surgeon was severely censured, and the occurrence reported to the Medical Board. But Sir David, then Major Stewart, who considered himself as having inadvertently been the cause of this particular access of disease, very spiritedly took upon himself the defence of his surgeon, and stated the case fully to the Medical Board, adding, "that on any day when the wind was easterly, he could show half the regiment affected with an apparently virulent ophthalmia, while in two days afterwards, if the weather was mild, and the wind south or west, all appearance of disease would disappear."

Egypt, as has been remarked by Mr. Edmonstone, may be considered as the very hot-bed of ophthalmia, and is perhaps the part of the world in which all the alleged causes of ophthalmia, arising from soil and climate, exist in the greatest abundance and force. This circumstance may account for the prevalence of the disease in that country; and that such a combination of causes may give rise to an ophthalmia, which by frequency, inveteracy, or neglect, acquires the power of self-propagation, is consistent with what has been observed in the history of some other diseases. Whoever reads the various accounts given of the disease termed Egyptian ophthalmia, particularly those of Dr. Vetch and of the late Sir Patrick M'Grigor, contained in the third volume of the "Transactions of a society for the improvement of Medical

and Surgical Knowledge," will, I think, admit that the disease is communicable from one person to another only by the application of the infectious matter to the eyes. The opinion that the disease is ever communicated from one person to another through the medium of the atmosphere, is at present nearly abandoned, although Sir William Adams maintained, that he had seen many cases which prove that the disorder may spread like small-pox, without inoculation. Dr. Vetch has well observed, that, from whatever cause inflammation of the conjunctiva may originate, when the action is of that nature or degree of violence as to produce a purulent or puriform discharge, the discharge so produced operates as an animal virus when applied to the conjunctiva of a healthy eye. And, considering the various modes by which such contact may occur, it is obvious that wherever ophthalmia prevails, whether it be the effect of local conditions of the soil or of the atmosphere, "this contagious effect must sooner or later mix, and unite its operation with that of the more general and original cause."

Upon the venereal diseases of the eye, so well described in the writings of Lawrence and Hewson, it is not my present purpose to enlarge, but there is one peculiar source of purulent ophthalmia which it may be necessary here to notice—I mean that arising from the application of gonorrhœal matter to the eyes, or, by metastasis from a suppression of the gonorrhœal discharge. Although I can scarcely say that I have myself witnessed an unequivocal instance of ophthalmia arising in either of these ways, yet the fact that it occasionally does so, is put beyond doubt by the testimony of numerous writers; and amongst the Belgian troops, of whom I saw several affected with ophthalmia a few years ago at Antwerp and Brussels, the gonorrhœal discharge is considered to be a frequent source of the disease. But the frequency of this mode of infection must be greatly lessened if Dr. Vetch's opinion be correct. From some experiments and observations detailed in his work on the diseases of the eye, Dr. Vetch is led to infer, that matter taken from the urethra is not capable of infecting the eyes of the individual by whom such matter is secreted, though probably capable of doing so to the eyes of another person. This opinion may be sup-

posed to gain confirmation from the rarity of the cases in which ophthalmia has, even in appearance, had the most remote connection either with the direct contact of the gonorrhœal matter or with a suppression of the gonorrhœal discharge. Dr. Farrel, who had extensive opportunities of seeing this disease in Egypt and the Mediterranean, asserts that a single case of this kind never presented itself to his observation, although from the habits and negligence of soldiers this might have been expected; and he says, "I have repeatedly had patients under my care who laboured under both gonorrhœa and ophthalmia, without being able to trace any connection between these complaints." Dr. Walker of this city, an old pupil of the Class of Military Surgery, who has devoted his attention most successfully to ophthalmic disease, has mentioned to me a remarkable case of an officer "who contracted a gonorrhœa, and as the discharge from the urethra diminished, the conjunctiva became inflamed, with a secretion of puriform matter. The eyes got well, but the discharge from the urethra again made its appearance. This took place twice, till both diseases had worn themselves out; and the patient stated that the same thing had happened to him on one or two previous occasions." Dr. Walker adds, that he has on more occasions than one distinctly traced an attack of gonorrhœal ophthalmia to the accidental contact of matter from the urethra of the same individual with his eye, contrary to Dr. Vetch's belief.

I wish I could divest myself, as completely as Dr. Farrel seems to do, of all suspicion of another cause of ophthalmia—I allude to the artificial excitement of this disease by the introduction of various irritating substances into the eyes, of which some worthless soldiers have been guilty, with the intention of impairing their vision, so as to render them unfit for the service. Suspicions of the existence of such practices have not unfrequently been forced on the minds both of military and medical officers; and that these suspicions have not always been devoid of foundation, may be ascertained from various statements in Mr. Marshall's work on "the feigned disabilities of soldiers, and from the following narration of Dr. Hennen's:—"In a corps under my superintendence, which was in part recruited by convicts, and which was ordered to the West

Indies, the surgeon was led in one case to suspect the application of some acrid substance to the eye, by the depth and the defined edges of the ulceration. On minute examination of the person of the patient, a paper of corrosive sublimate was found in his possession, with some manuscript directions for its use, in which it was recommended to put a minute portion of this substance into the eye on going to bed, to repeat it every third night, and be cautious not to put too much, lest the eye should be destroyed. There was also annexed to this prescription, a form of receipt for removing the artificial disease thus produced. It consisted of a decoction of parsnips and clover with which the eye was to be fomented, and the leaves of the clover, softened by boiling, were to be applied to the part, and to be continued to it during the night." From a knowledge of these mal-practices it has been seriously questioned how far the British epidemic was spread by contagion, or had anything to do with Egyptian ophthalmia. Why was the disease so exclusively confined to particular regiments and garrisons? Why were women nearly if not wholly exempt from it? Why did the disease become more prevalent and severe after the passing of Mr. Windham's act, by which every man who was discharged as disabled was entitled to a pension? And why were the soldiers of the French army not affected, after their return home, with what we call Egyptian ophthalmia?

Having thus entered into a detail of the circumstances connected with the origin and progress of that severe form of ophthalmia which has made such ravages in our army, I proceed to offer a few remarks on its symptoms and modes of treatment. Of the numerous divisions of ophthalmia adopted by authors, one of the most comprehensive is that of the celebrated Professor Beer of Vienna, who divides this affection, according to the situation in which it originates, into three general forms—inflammation of the eyelids—inflammation of the parts between the orbit and globe of the eye—and lastly, inflammation of the eye-ball itself, or *ophthalmitis*. Of these several affections, numerous subdivisions exist; but, premising that the seat of the disease to which I wish more particularly to advert, is in the conjunctiva lining the eyelids, and covering the anterior part of the eyeball, I adopt the division of

ophthalmia employed by the distinguished Italian Professor Scarpa, and various other authors, into Acute and Chronic, as one of the best suited to the object proposed in the following observations; which is to give such a practical view of the subject as will enable us to meet it by the most efficient treatment, without bestowing too minute an attention on some of those minor shades of difference which it is impossible, and perhaps unnecessary to advert to in treating the disease on that extensive scale on which it has become the duty of military surgeons to meet it.

In the valuable work of Dr. Vetch, which has been so often referred to, the word ophthalmia is restricted to an inflammation of the conjunctiva, including that part of it which lines the palpebræ, as well as the portion which covers the eye, while Dr. Vetch employs the term *ophthalmitis sclerotica* to denote the disease as affecting the sclerotic coat of the eye-ball. To designate the affection commonly known by the name of *iritis*, he employs the term *ophthalmitis sclerotica interna*, or *ophthalmitis iritica*. These are subdivisions of great utility, as marking the different sites of the disease; and it may be observed, that its severity and difficulty of cure are in a great measure proportioned to the progress it has made from without inwards. Thus the inflammation, while confined exclusively to the conjunctiva, although sometimes a severe and obstinate affection, is less dangerous and less destructive to vision than the second species, or ophthalmitis sclerotica of Dr. Vetch; and the inflammation, when seated in the iris, is for the most part more difficult to subdue, and more apt to be followed by a permanent injury to the sight than in either of the two former cases.

Ophthalmia has frequently been referred to, and selected as an illustration of all the phenomena of inflammation, pain, swelling, heat, and redness. Of the last particularly, it exhibits a most striking example, from the contrast which the blood-red colour of the inflamed conjunctiva presents to its natural white or pearly appearance, at the same time the other symptoms of inflammation above mentioned are often well marked in this affection. Here we often find the swelling great, the pain severe, and the sense of heat distressing, to which are superadded intolerance of light, and an increased

secretion of tears, symptoms peculiarly connected with the structure and functions of the organ affected.

In general the first symptoms of the approach of purulent ophthalmia are a sense of itching, or a feeling analogous to it, leading the patient to rub the part affected, and an increased secretion of tears, which bedew the surface of the cornea, and partially obscure the vision. In this state, however, unless the patient is previously prepared to expect its approach, from its prevalence as an epidemic, the disease is for the most part too little observed, and the first sensation which he complains of is that of sand or dust having got in between the eyelids and ball of the eye. This is a symptom particularly characteristic of that form of the disease which affects the troops, as almost every writer on the subject has noticed, and as I have myself had repeated opportunities of observing. Patients thus affected frequently apply to their comrades, or to their medical officers, for the sole purpose of having the offensive substance removed, thinking if this were accomplished they would be quite well; and this peculiar sensation has very frequently been observed to come on during the night, which gives rise to the conjecture of its being caused by something having fallen into the eyes from the roof of the barrack. It has also been observed that "this sensation is not constant, as it comes on suddenly, and as suddenly departs, confirming to the patient the idea of something extraneous being lodged in the eye." Its intermittent form has been explained, by observing that when a vessel on the globe of the eye first becomes turgid, its projection excites in the conjunctival lining of the palpebræ an uneasy sensation, as if it moved over a particle of sand or other extraneous substance—a sensation which gradually subsides as the tension of the affected vessel diminishes, and as the palpebral lining becomes accustomed to the new feeling. The accession of this symptom so frequently in the evening or early part of the night, is perhaps owing to the change from the bracing effects of the open air, to the close atmosphere of a full barrack-room, while the temperature of the eye is augmented by the closing of the eyelids in the attempts to sleep, and the determination of blood towards it in some degree increased by the horizontal posture.

The appearance of increased vascularity, which subse-

quently becomes conspicuous over the whole of the conjunctiva, is at first confined to that portion of it lining the eyelids, and if examined in a very early stage of the disease, this part will be found to exhibit a mottled appearance, the inflammation affecting detached portions or patches of the membrane, and these patches become gradually more extensive, until the whole of the conjunctiva assumes a fleshy redness. This inflammation of the conjunctiva is attended from the first with a great degree of swelling and effusion of serum or fibrin, which occurs more readily, and extends more rapidly in this situation from the lax and open texture of the cellular membrane, connecting the conjunctiva with the ball of the eye. This chymosis is often so considerable as to elevate the conjunctiva very much from the posterior part of the eyeball, while, in consequence of the firm adhesion of the membrane round the margin of the transparent cornea, the swelling is suddenly stopped at this point, and the cornea is to be seen at the bottom of a circular cup-like depression. While this effusion is going on under the conjunctiva, œdema also takes place in the substance of the palpebræ, sometimes to an enormous extent, completely shutting up the eye, and disfiguring the whole countenance; and as the integuments swell outwards, the firm inelastic margin of the tarsi not admitting of a correspondent extension are in some degree inverted, so that the integuments of the upper and lower eyelids come to meet over the tarsi. Of this particular appearance a representation is given in Dr. Vetch's second work; and of many minute circumstances which I am now attempting to describe verbally, admirable representations are given in the plates attached to Demour's "Traité des Maladies des Yeux."

During the progress of the inflammation, the discharge, which at first consisted of a little mucous fluid lodged in the duplicature of the conjunctiva, progressively increases, and assumes the character of pus. When mixed with the lachrymal fluid it is sometimes pent up in large quantities within the palpebræ, and gushes out in a stream when they are opened; at other times it finds an exit more readily towards the inner canthus of the eye, and continues to flow over the cheek in a quantity almost inconceivable, "amounting to some ounces in the course of the day." The patient during this period is

affected with severe lancinating pains darting through the eye, or referred to the interior of the head; he also complains of fulness and throbbing of the temples, a symptom which, like every other connected with the disease, is often remittent or intermittent. While the disease is confined exclusively to the conjunctiva, the symptoms of pyrexia are not generally urgent, sometimes not at all perceptible, until the inflammation proceeds to affect the sclerotic coat, when the pulse becomes quickened and the pain increased, from the dense unyielding nature of this tunic. In describing the inflammation of the sclerotic, Dr. Vetch has subdivided it into what he has termed *sclerotico-corneal* and *sclerotico-choroideal* inflammation, the first being marked by a tendency to ulceration of the cornea, originating from contagion, or from occasional external causes, and constituting that form of the disease from which so many soldiers have lost their eyesight. The sclerotico-choroideal inflammation, on the other hand, which manifests itself most obviously in the form of *iritis*, is in many instances the effect of an arthritic or rheumatic diathesis, sometimes occurs as a symptom of syphilis, or appears in peculiar habits as the result of a mercurialized state of the system.

The first variety of the affection may be considered as the advanced stage of the purulent ophthalmia of the troops; and Dr. Vetch, who has accurately marked the progress of the different phenomena, thinks that the distinction between conjunctival and sclerotic inflammation may be pointed out by a very marked difference in the appearance of the blood-vessels ramified on the surface of the eye. In the inflammation of the conjunctiva, the blood-vessels admitting of more speedy and uniform distension, often swell out suddenly, so as to give to the eye the appearance of a uniform fleshy mass, not inaptly compared to the valvulæ conniventes of the intestinal canal; while "the circumstances," says he, "to be regarded in the appearance of the inflamed vessels of the sclerotic coat, are chiefly these: posteriorly we observe only a few interspersed trunks, which do not affect the intermediate space; but these, diverging as they come forwards, produce a zone, more or less complete, of minute hair-like vessels, distinguished by their rectilinear direction, and their uniform concentration towards the margin of the cornea—their colour deepening as the disease

advances." This is a distinction which I have sometimes been able to observe in practice, but in general, when inflammation of the sclerotic coat supervenes upon an attack of conjunctival inflammation, the swelling and ecchymosis already present effectually prevent any accurate observation of the state of the vessels which supply the sclerotic. The eyeballs are, by the swelling of the palpebræ, often entirely concealed from our view, and in judging of the progress and severity of the affection, we can derive little or no aid from ocular observation.

The symptoms which more peculiarly mark the accession of sclerotic inflammation, are the supervention of pyrexia, in acute cases and in irritable habits, often to a very considerable extent; quick pulse, restlessness, and inability to sleep, more peculiarly characterise the fever attendant upon ocular inflammation, while heat, thirst, prostration of strength, and loss of appetite accompany it as in other cases. The pain attendant upon sclerotic inflammation is sometimes of the most excruciating kind: patients may be seen writhing under it, apparently suffering as acutely as they do from the most severe surgical operation. It is not unfrequently described as if numerous needles were thrust into the eyeball, and recurs at intervals, sometimes for days, sometimes for weeks, until a paroxysm terminates in rupture of the cornea and effusion of the aqueous humour.

The cornea is that part of the eye to which the greatest danger is to be apprehended in purulent ophthalmia. It is apt to ulcerate or slough, and a staphyloma is the result. Rupture of the cornea is often marked by the sudden cessation of pain, and the feeling of a gush of warm fluid from the eyeball. Indeed the sensation of bursting of the eye is sometimes so distinct that a patient has been observed fumbling amongst the bed-clothes seeking for something which he supposed had escaped from it. The relief afforded by this occurrence to the affected eye is often followed by an aggravation of the symptoms in the other; and the sensation of rupture may recur repeatedly for weeks, the attacks gradually becoming shorter and less severe as the disease becomes exhausted by its own violence. The rupture of the cornea has hitherto been described from the sensations of the patient alone, it being generally impossible, from the swelling of the external parts,

to ascertain its occurrence in any other way. Amongst the variety of appearances, however, which the disease has presented to the accurate scrutiny of Dr. Vetch, he has had an opportunity of observing very minutely the changes occasioned by rupture of the cornea; and I cannot convey a more perfect idea of the nature of this accident than by employing his own words:—

"A more accurate inspection has now taught me, that any visible alteration in the cornea is an event subsequent to its rupture. In the first case in which I traced the steps of that process, I examined the eye before the accession of the paroxysm which was terminated by the rupture of the right cornea, in which there was not at that time the least perceptible alteration; the patient did not see with his usual distinctness, and the iris did not contract much by exposure to the light. I found the eye in the same state after the accession of the pain, when the repetition of the examination, as is usual, had no effect in increasing it; it continued for about two hours, when he felt the cornea give way, and scalding water rushed over his cheek. On again examining the eye a short time after, from the natural appearance it seemed to possess, I was inclined to doubt the accuracy of the sensation, and to think that too much reliance had been hitherto placed on it. The patient now saw with more correctness than before. My attention was at last attracted by a small line which extended across the lower segment of the cornea, and which remained without any alteration after the eye was washed with tepid water; but as any attempt to ascertain the nature of this line gave uneasiness, its examination was left till next day, when I found it more visible along its whole extent, from a slight opacity which accompanied it, and which daily increased till the greater extent of the cornea was not only opaque, but projected in an irregular cone. As this alteration of structure went on, the vision, which continued for some time after the rupture more correct than before, became completely obstructed."

"Other cases have occurred, which, by corresponding with the above, confirm the account I have now given, from which it appears that the aqueous humour escapes by a division of the cornea, nearly as clean as if cut by a knife, and that it is

to the attempts of the part to effect a reunion, under the presence of disease, that the future deformity is owing. Were the disease to subside immediately after the rupture of the cornea, this accident, in all probability, would not be attended with much permanent injury to the sight; but as, besides the obstacles which the presence of the disease occasions to its healthy reunion, the same causes which produce the first rupture continuing to operate so as to produce a second or a third, the deformity becomes further augmented, and the termination, with respect to vision, is proportionally unfavourable." Such is the series of phenomena which generally takes place in an acute attack of purulent ophthalmia, from the first appearance of inflammation, perhaps in mottled spots on the lining membrane of the palpebræ, to the subsequent affection of the whole conjunctiva, the extension of the disease to the cornea and sclerotic coats terminating in rupture of the cornea.

The treatment of this affection now claims our attention; and in so far as general remedies are concerned, the practice which I would urge, in the acute stage of ophthalmia, and as it occurs amongst young and otherwise healthy soldiers, consists essentially in moderate bleeding and low diet. The observation cannot be too often repeated, that by one early and well-timed bleeding, the disease is more effectually subdued, and the cure accomplished with much less expenditure of blood, and less injury to the system, than by repeated bleedings to a smaller extent; and there can be no doubt that in consequence of the encouragement which was at one time given to repeated general bleedings, many constitutions have been injured, and the cure in many instances ultimately protracted. Wherever a subsequent evacuation of blood becomes necessary, it will, for the most part, be taken with greater advantage from the temporal artery, or by leeches from the immediate neighbourhood of the eye.

The effect of long continued nausea and sickness in allaying febrile excitement, and checking inordinate vascular action, is known to every tyro in the profession; and the production of this state by artificial means has not been overlooked by oculists. The practice of keeping up incessant vomiting for several hours, was strenuously urged by Sir William Adams; and while some of his contemporaries have justly condemned

this practice as harsh and unsatisfactory, they appear to me to have scarcely rated the good effects of nauseating antimonials sufficiently high. Nausea may be kept up for a considerable time with advantage, but vomiting should not be induced, as it causes ocular congestion and tends to frustrate our object.

Mercury in some form or other ought to be given till slight ptyalism is induced, as it checks the effusion of fibrin between the conjunctiva and sclerotic, but it must be given with caution. The circumorbital pain, often a very troublesome symptom, is frequently alleviated by rubbing into the temples opium combined with mercurial ointment.

Scarifications of the surface of the eyeball, or lining membrane of the palpebræ, and the application of leeches within the eyelids, are measures which my own experience does not enable me to recommend. The irritation occasioned by the scarifications, or leech-bites, and the inflammation necessarily established for the cure of the wounds inflicted by them, are more than sufficient to counterbalance the good effects of the small quantity of blood abstracted by this means. Similar objections apply, in some degree, to blisters, particularly in the acute stage of the disease, and in the way in which they are frequently employed, of a very small size, and applied close to the eye; but in the chronic stages, and in some of the sequelæ of ophthalmia, blister issues, on the temples, behind the ears, or on the nape of the neck, are highly beneficial. When much ecchymosis, and protuberant swelling of the conjunctiva occurs, benefit is often derived from the division, or even the excision, of portions of the swollen membrane, care being taken to make the incisions in a radiating or divergent form, from the edge of the cornea outwards, not in a circular form round its margin, by which the due supply of blood to the cornea may be cut off and sloughing induced.

In slight cases, and in the very incipient stage of the complaint, the effect of stimulating or acrid substances, dropped into the eye, is sometimes successful in checking the suppurative inflammation, and putting a complete stop to the progress of the disease. The experiment, however, is somewhat hazardous; for if not successful, such applications naturally aggravate the subsequent attack. Of local applications used in this way, the sulphate of alum in solution is perhaps the

most generally useful, and may be employed even in the earliest stage of the disease, without much risk of increasing the after symptoms. Solutions of the nitrate of silver have long been in general use in cases of ophthalmia; and notwithstanding the objections offered to this practice by Dr. Jacob of Dublin, the general confidence of professional men in it has not been shaken. It is particularly urged by some of those, whose experience has been acquired in the extensive field which the army has unfortunately presented for the treatment of this disease, and amongst the more recent advocates of this practice, we find Mr. Melin and Dr. O'Halloran. Mr. Guthrie has long been in the habit of employing successfully, at the Westminster Eye Infirmary, an ointment of nitrate of silver, in the proportion of from two to ten grains, with fifteen drops of the liq. plumb. subacetatis to a drachm of wax ointment; and although this may be considered more peculiarly appropriate to the chronic form of the disease, yet it is often applied in all stages of ophthalmia, with the view of "inducing an action greater, and of a different nature, to that already existing in the part." The facility with which the strength of the caustic solution and ointment may be varied to suit particular cases, gives them a great advantage as general applications, and has led to a preference of these remedies over the Vinum Opii, and other articles, which were at one time very much employed.

The sedative and astringent powers of tobacco infusion, both administered internally and applied locally to the eye, are recommended by Dr. Vetch, but of this I have no experience. In the very early stage of the disease, and in the highly irritable state of the parts, there is no application from which better effects are experienced than from fomentations, either with plain warm water, or with the common decoctions of chamomile and poppy, with a little alum in solution. These are beneficial not only by soothing the irritable surface of the eye and eyelids, but by constantly removing from them the profuse and acrid discharge. Hence their superiority to cataplasms, which foster the suppurative process, confine the discharge, and thus prove highly conducive to the destructive effects of ocular inflammation. We must be careful not to mistake the temporary relief of the symptoms from any of these applications, for a security of the organ. The disease

must be carefully watched, and no external application suffered to conceal the changes which may be going forward. Cold applications, wherever they are attended with relief, are much less injurious in their after consequences, and may be much longer continued than either fomentations or poultices, without the risk of producing an injurious relaxation of the vessels and tedious convalescence. The general health ought in all cases to be strictly attended to, and if the patient be of feeble powers he will require the moderate use of stimulants and tonics.

In concluding these remarks on the local applications most generally used in ophthalmia, it may be right to express my opinion on the common practice of using shades, and shutting up patients in dark or small-sized apartments. These are measures highly calculated to increase the irritability of the eye, to protract the cure, and to produce frequent relapse; but where ophthalmic cases become numerous, it may be well to have one or more wards for their reception, coloured green, as in the hospitals at Vienna, at Brussels, and elsewhere. A free exposure to the atmosphere is in general preferable to keeping the eye constantly or closely covered with any application whatever; and although the light should be so regulated as not to prove offensive to the eye, yet it may be remarked, that the cure of ophthalmia, as well as of other diseases, is most satisfactory and most permanent, when accomplished with the least deviation from those habits to which the patient must of necessity return. Amongst other measures which I have long been in the habit of enforcing in obstinate cases of ophthalmia, is that of keeping the head closely cropped or shaved. This appears to me to operate beneficially, by taking off or withdrawing the determination to the eyes; and of this view of the matter I have lately met with the following curious confirmation in a work where one would least of all have looked for it—"London as it is."—"Constant clipping of the hair promotes its growth, and thereby exhausts the soil, and this is said to account for the frequency of baldness in this country amongst males." Whatever may be thought of the theory, about which I am nowise anxious, I am satisfied from much experience of the beneficial effects of the practice.

Ulceration of the cornea occurs often in cases of purulent ophthalmia, and it is necessary to observe, that if the ulcer makes its appearance in the height of the disease, it is the abatement of the inflammation, by the means already pointed out, which first demands our attention. In other cases, however, it has repeatedly been observed, that it is the ulcer which keeps up the ophthalmia, not the ophthalmia the ulcer; and in such cases remedies ought first to be applied to the ulcerated parts, calculated to lessen the morbid irritability, to change the action of the sore, and to stop the destructive process going on. To effect these objects, the practice usually employed is the application of the nitrate of silver to the surface of the ulcer, for which purpose a piece of this substance may be pointed like a pencil, and the sore gently touched with it, or a weak solution of the nitrate of silver may be dropped into the eye. This removes the excessive irritability, and for the most part, soon induces a new action in the part, and converts the process of ulceration into that of granulation and cicatrization.

Opacities of the cornea, of different densities, are very frequent consequences of ophthalmia; and these have, according to their nature or site, been divided into different varieties. When the opacity is confined to the conjunctival covering of the cornea, it is termed *Nebula.* When it arises from the deposition of lymph between the laminæ of the cornea, it is called *Albugo.* And when from the cicatrization of an ulcer, *Leucoma.* In all these affections the ratio medendi is the same, viz., to excite an absorption of the substance giving rise to the opacity. Nebula, or that opacity which is confined to the conjunctival covering of the cornea, occurs most frequently in patients affected with chronic inflammation; and in this form of opacity, the local applications used with most success are, solutions of the nitrate of silver, varied in strength according to the effects produced; solutions of corrosive sublimate or sulphate of zinc, with wine of opium, and a variety of stimulating ointments. Albugo is deeper seated and more dense than nebula, and consequently more difficult to remove. When seated opposite the pupil, vision is nearly destroyed; but this affection is for the most part less extensive than nebula, and the remedies recommended for nebula

are similar to those which have been found useful in albugo. Leucoma, the third species of opacity, is that arising from the healing of an ulcer; and although it is superficial, and less dense than the last described species, yet it is less influenced by medicines. The drops already recommended, and the stimulating ointments, are in some instances found to produce a good effect.

Inflammation of the iris is one of the most formidable concomitants of ophthalmia; but upon the unsatisfactory and contradictory causes which are assigned for its occurrence, it does not appear to me that I can enlarge in such a manner as to give more clear conceptions of its treatment. Suffice it then to observe, that in many cases of severe ocular inflammation, an increasing but regular contraction of the pupil, and diminished mobility of the iris, with a vascular zone on the sclerotic, begin to show that the inflammation has extended to this part also. The pupil for some time preserves its circular shape, the smaller ring or pupillary margin of the iris becomes of a reddish colour, while its exterior margin, or larger ring, assumes a greenish hue; but these appearances are modified by the natural colour of the iris. The inflammation continuing to increase, the pupil becomes more and more contracted till its aperture is often altogether obliterated. This is followed by the effusion of coagulating lymph from the posterior surface of the iris, which forms a connection between it and the capsule of the lens. This adhesion rendering the iris immovable at particular points, the shape of the pupil becomes irregular; and if the disease is still suffered to proceed, small pustules of a dark orange colour sometimes appear on the surface of the iris, which terminate in suppuration, and as the matter they contain falls into the anterior chamber, *hypopion* is produced.

The occurrence of iritis is fraught with so much danger to the organ of vision, that we cannot be too early or too assiduous in our endeavours to obviate the disorganization of the eye, in which it is so apt to terminate. This is most likely to be accomplished by local depletion, either by opening the temporal artery or by cupping, combined with the internal use of calomel and hyoscyamus or opium, which in this instance seems to me to operate more like a specific than in any other case:

and it is one of the singular and apparently contradictory circumstances attending this affection, that whether it occurs without any obvious constitutional taint, whether it occurs as a secondary symptom of syphilis under the non-mercurial practice, or whether it occurs in connection with a mercurialized state of the system, the employment of mercury is for the most part attended with the same good effects. In the last case it proves, as Mr. Travers has observed, both the bane and the antidote, tending to check the effusion of lymph and to promote its absorption. For this purpose it has been recommended locally; the blue ointment combined with opium, extract of hyoscyamus, belladonna, or stramonium, to be rubbed morning and evening into the eyelids and temple. It is, however, the combination of calomel with opium given internally, general and local bleeding, warm bath, purgatives, and antimonials, with the application of extract of belladonna round the eyelids, to which I have been accustomed to trust in the treatment of this affection, and my success in numerous instances induces me to recommend such treatment with confidence.

One of the most serious consequences of inflammation of the iris is complete closure of the pupil, an affection only to be remedied by an operation; and as I have avoided going into the details of operations in these outlines, I will merely observe, that the only operation which I have practised in this case is that of the late Mr. Gibson of Manchester, the steps of which are detailed in various publications, and are well explained by the assistance of the numerous sketches which I possess of cases successfully operated on, in the ophthalmic department of the General Hospital at Chatham, by Staff-Surgeons Murray, Dease, and Lindsay.

Amongst the most troublesome sequelæ of purulent ophthalmia, are the projection of the cornea termed *Staphyloma*, and the affections of the eyelids, termed *Entropium* and *Ectropium*, the necessary operations for which may be shewn on the dead body. But there is one peculiar affection of the eyelids, to which, from its extensive prevalence, I conceive it my duty to advert more particularly here. When the violence of the disease has abated, and the tumefaction of the palpebræ so far subsided as to permit the eyelids to be everted, or when the disease itself has produced this eversion, by the extent and

preponderance of the swelling of the conjunctiva beyond that of the external teguments, the protruded surface often presents a granulated appearance. This affection of the palpebræ consists of enlargement and hypertrophy of the papillæ of the conjunctiva, there being no true granulations; and it has been distinctly proved, that so long as this remains, no patient is free from relapse, but is constantly liable, upon the slightest excitement, to a recurrence of the purulent secretion capable of extending the contagion, and to repeated accessions of sclerotic inflammation, terminating in opacity of the cornea, or in ulceration of its coats. The best explanation, as well as the most eligible mode of treating this particular affection, is to be found in the writings of the army surgeons, and particularly of Dr. Vetch. It was, however, claimed by Sir W. Adams, as a most important discovery, although in his mode of treatment, by excision, he was decidedly anticipated by another famous oculist, Sir William Reid, who wrote a treatise on the eye in 1706. This work, which gives an account of sundry cures performed in the Universities of Oxford, Cambridge, Edinburgh, Glasgow, Aberdeen, St. Andrews, and Dublin, contains, amongst other curious matter, a chapter on "small excrescences of flesh in the eyelids, concerning the cure of which," the author observes, "if they be thick and gross, they must be cut away dexterously with the point of a lancet, and afterwards let the place be touched with a little fine salt, alum, or copperas water, applying also such medicines as may dry the eye without great pain."

The treatment of this affection by escharotics was recommended by St. Yves, and after a very full trial of excision, both with the scissors, as practised by the late Mr. Saunders, and with the knife, as recommended by Sir William Adams, the army surgeons have, without, so far as I know, one exception, returned to the general use of escharotics, particularly to the sulphate of copper and nitrate of silver. For although some peculiar views have been entertained relative to the nature of what has been termed the granular state of the lining of the palpebræ, yet I believe its treatment by mild escharotics as preferable to excision, is fully established by continued observation. And of the length of time during which this subject has been more or less under the notice of the profession, some

idea may be formed from the following passage of a Report of a Committee of the House of Commons appointed in 1821, to inquire into the establishment of the Ophthalmic Hospital in the Regent's Park, and the claims of Sir William Adams upon the public :—" Your Committee have to report that the existence of these granulations, and the necessity of removing them, seems to have been known in very early times, and are adverted to in the works of Celsus in the first century, of Paulus of Ægina in the seventh, of Rhases the Arabian in the tenth, and in the work of Sir William Reid in the reign of Queen Anne ; that consequently no person in the present day can on this subject claim more than the merit of having revived knowledge which had fallen into neglect. Your Committee do not feel it necessary to pronounce between the conflicting claims upon this head, or by recommending a parliamentary reward for such revival, to decide to whom that merit properly belongs. They conceive that question is best left to the decision of the profession and of the public. But they are of opinion that Sir William Adams has, among others, been greatly instrumental in promulgating this knowledge, and in rendering it generally available."

How any pretensions to discovery on the part of Sir William Adams could have been entertained so late as 1821, appears to me astonishing, considering that this morbid state of the eyelids was described by Scarpa twenty years before, and its cure by caustic and excision, with the scissors and with the knife, most distinctly detailed by that accurate writer in 1801. The practice of excision was also in use in the British army so early as 1807, as I have been informed by the late Dr. Shortt, who had charge of many ophthalmic patients in Egypt during that year, and who superintended a large ophthalmic hospital in Sicily in 1808, and the subsequent years. Of the pretensions to superior skill and success in the treatment of ophthalmic patients, so confidently brought forward by Sir William Adams, some curious results are to be found in a Report submitted by the members of the Army Medical Board to his Royal Highness the Commander-in-Chief, upon the subject of out-pensioners of Chelsea Hospital, treated for diseases of the eyes. And in a letter addressed by Dr. Vetch in 1819 to Lord Palmerston, then secretary at war, on the sub-

ject of the Ophthalmic Hospital, the writer remarks, "it cannot fail to surprise every impartial mind to observe, that even from the report of Sir William Adams himself, so far from effecting a national saving of £60,000 per annum, by a reduction of the ophthalmic pensioners, *not one has been sufficiently benefited to admit of his pension being either reduced or taken away;* and of six soldiers included in the report, all of them cases of opaque cornea, combined with the secondary stage of Egyptian ophthalmia, not *one has been rendered fit for duty, and all have been added to the list of pensioners.*"

Into farther details it is impossible for me to enter at present, but I cannot withhold, from the junior medical officers of the army, and from those who are yet to enter the department, a knowledge of the injurious aspersions which were thrown upon their predecessors in reference to this subject, and of the triumphant manner in which these aspersions were done away in the opinion of our late illustrious and excellent commander-in-chief, who, with that attention to the feelings of every officer under his command, for which his Royal Highness was so remarkable, addressed the following letter to Sir James M'Grigor, dated Horse Guards, 28th February 1821:—"Sir, It having been represented to me that you and your colleagues in the superintendence of the medical department of the army, and many respectable individuals of various ranks belonging to it, have expressed some apprehension of the general prejudice which might be created against you in the opinion of the public, by reflections cast upon your general conduct, more especially as relating to the part which some of the army medical officers have taken in the investigation which was instituted in my presence into certain proceedings of Sir William Adams, connected with his care and management of the ophthalmic hospital; I cannot hesitate in conveying to you, and through you to your colleagues, and to the army medical officers in general, the expression of my entire and unequivocal approbation of the zeal, ability, and correct integrity with which you and they have discharged the general duties intrusted to you.

"Although I wish not to enter into the immediate merits of the discussion with Sir William Adams, whose duties are not subject to military control, I consider it equally due to

you, and to the other army medical officers concerned, to declare, that in every transaction connected with that discussion, which has come within my knowledge, your conduct and theirs appear to me to have been influenced by a zealous and very commendable anxiety for the good of the service in general, and for the welfare of the individuals who have been subjected to Sir William's treatment, and that I am satisfied that no charge was ever more unfounded, or less reconcilable to the characters and conduct of the army medical officers, than that stated to have been brought against them, of having entered into a conspiracy against Sir William Adams.—FREDERICK."

In conclusion, I must observe, that it is by an active and vigorous treatment of the early stages of ophthalmia, that its troublesome sequelæ are alone to be obviated, and that it is by their prevention, rather than by their cure, that we can hope to impede the destructive ravages of this disease, or to preserve any considerable number of its victims to the service. Under this impression, I have been induced to enter at length into details of its origin and progress in the British army; and have chiefly confined myself to the treatment of ophthalmia previous to any disorganisation of the eye; and I would particularly advert to the common means by which ophthalmia was supposed to be propagated amongst the troops. The crowding of barrack rooms—the practice of two or more soldiers sleeping in the same bed—the inadvertent and indiscriminate use of the same basins, buckets and towels—even the touching of various articles of barrack furniture by the hands of those labouring under the complaint, occasionally soiled with the discharge from the eyes—have been considered sufficient to propagate this virulent disease. In short, a direct contagion was looked upon as the chief source of the epidemic amongst the troops in this country; and to circumscribe the limits of its operation by judicious separation of the sound and infected, by prohibiting all promiscuous use of the same articles of bedding and barrack furniture, are the steps which reason seems to dictate and experience to recommend.

SYPHILIS.

The origin of the venereal disease, as well as its treatment, has been matter of keen controversial discussion, but into its remote history it seems unnecessary for our purpose to enter. It will be sufficient to offer a few remarks on the first appearance, or, to speak more properly, on the first general notice of it in Europe. Alexander Benedictus, who wrote about the year 1497, assigned to it an American origin, looking upon it as having been imported from that country. In the month of March 1493 Columbus returned to Spain, after the discovery of a new world, and in the summer of that year the venereal disease made its appearance in various parts of Italy and Germany. It was, however, in the French army employed at the siege of Naples that its ravages were most conspicuous; and Benedict, who was a physician in the Venetian army in 1495, and who had therefore an opportunity of observing the first appearance of this disease, observes in his work De Omnibus Morbis, "that a new French disease, or at least one that was unknown to former physicians, owing to the pestiferous aspect of the stars, had burst in upon them from the West." The novelty of its symptoms, and the wonderful rapidity with which it was propagated throughout every part of the then known world, soon rendered it an important object of medical inquiry. The disease became the terror and scourge of every country; the physicians stood appalled, and, confessing their ignorance of any means of cure, and their inability to check the progress of the disease, confirmed the opinion of its recent origin.

We have, however, in these early periods of its history some very accurate accounts of its appearance and progressive extension. Thus, Marcellus Cumanus observes, "that he had seen many officers and foot soldiers, while he was in the camp at Navarre, to have several scabs or pustules breaking out on the face, and spreading all over the rest of their bodies; the first of which appeared usually under the preputium, or on the outside like a grain of millet; sometimes behind the glans, with a slight itching—at other times a single pustule would arise like a little bladder, without much pain, but itching also;

if rubbed or scratched there arose an ulcer, corrosive and smarting like the sting of an ant." John De Vigo, speaking of this disease, says, "Ejus origo in partibus genitalibus, viz. in vulva in mulieribus, et in virga in hominibus semper fere fuit, cum pustulis parvis interdum livid coloris, aliquando nigri, nonnunquam rubelli, *cum callositate eas circumdante*." These descriptions appear to me deserving of particular attention; because, on the one hand, they admit that latitude of appearances which, in characterising venereal ulcerations, I have always held it necessary to adopt: and, on the other hand, they afford a proof that the hardened and callous base of the ulceration, which was assumed by Mr. Hunter as the peculiar and distinctive character of chancre, did not escape the notice of the very earliest writers on this disease.

For many years after the appearance of syphilis, the infection was supposed to be conveyed, like the plague, from one person to another. Those who were infected were driven from society into the very forests; and in large cities it was considered necessary to provide for the public safety by the most severe laws against these unfortunates. Thus, there is extant in the acts of the parliament of Paris, dated 6th March 1496, a decree by which those infected with the venereal disease were prohibited under pain of death, from conversing with the rest of the world, and obliged to retire into the suburb of Saint Germain, to places set apart for their reception, being severely flogged both before and after their incarceration. And on the 27th of May 1497, we find the bishop of Paris presenting a petition to the court in favour of those affected with the *great pox*; in which he sets forth, that a number of those who had been sent to the suburbs of the city, in consequence of the decree just quoted, were now cured of their disease, but that their money had failed; and he beseeches the court that fifteen or sixteen crowns, which for ten years past had lain in the hands of his notary without an owner, might be ordered to be distributed amongst them; which was accordingly granted.

The disease which excited so much alarm in Paris, appears to have speedily found its way to the good town of Edinburgh, and to have occasioned no less consternation here. In the Council Register, under date of the 22d September 1497, is to be seen an order of the Privy Council, banishing

those affected with the venereal disease to the Island of Inchkeith, whither their medical attendants were compelled to accompany them. The order is in the following words:— "That all manner of persons being within the freedom of this burgh, who are infected of the said contagious plague, called the *Grand Gore*, devoid, rid, and pass out of this town, and compear upon the sands at Leith, at ten hours before noon, and there shall have and find boats in the harbour, ordered to them by the officers of the burgh, ready furnished with victuals, to have them to the Inch, and there to remain till God provide for their health; and that all other persons who take upon them to heal the said contagious infirmity, and take the care thereof, that they devoid and pass with them, so that none of those persons who take the cure upon them use the same cure within this burgh."

While these and numerous other enactments of the civil authorities, which took place about the same time, show the general alarm excited by the appearance of this disease towards the end of the fifteenth century, they at the same time savour of the vague and uncertain notions at first entertained of the means of its propagation. But, long prior to this period, regulations existed in the army, whether introduced for moral or for physical reasons, eminently calculated to obviate the true source of venereal infection, and to prevent the extension of this disease amongst the troops. In the rules and ordinances of war enacted in the time of Henry the Fifth, we find it "ordered that no man keep a harlot in his quarters, upon pain of losing a month's pay; and if any man can find any common woman or women in the quarters, my lord commands him to take from her or from them the money found on her or them, and to take a staff and drive her out of the army, and *break her arm*." In another part of the same code, we find that this order was to be particularly enforced during the sieges of towns, castles, and fortresses; and that no women of the above description were upon such occasions permitted to remain within a league of the army, under pain of fracture of the *left arm*. In a subsequent code of articles and ordinances of war, printed at Edinburgh in 1643, we find that this fracture of the left arm was commuted for another punishment in some measure proportioned to the moral guilt of the

offender. By this it is enacted, "that if any common women shall be found following the army, if they be married women, and run away from their husbands, they shall be put to death without mercy, and if they be unmarried, they shall be first marked by the hangman, and thereafter by him scourged out of the camp."

To the institution of a prophylactic measure somewhat akin to this, I was myself once witness while serving with the 2d battalion of the Royals in India. The regiment being overrun by venereal disease, and upwards of sixty men off duty from this cause, the commanding officer determined on adopting the most summary means for its suppression. With this view, he, without any previous warning, sent a patrole round the barracks in the middle of the night, to take up every unmarried woman who should be found there. These were all confined in the congee-house, or black-hole, until the following morning, when they were inspected by the native doctors attached to the regiment. Such of them as were found free from disease were furnished with written passports, giving them free access to the barracks at all times; those who were found diseased were drummed out of the fort, after having their heads shaved and white-washed, a mark of disgrace which was for a time indelible, and was a sufficient beacon to cause them to be shunned.

These semibarbarous but salutary proceedings are, however, little consistent with our modern notions of liberty and justice; and we must therefore in general rest satisfied to oppose the disease by the most efficient practice, and to endeavour to improve that practice by a careful study of its phenomena. These phenomena have long been divided into Local and Constitutional, or into *primary* and *secondary* symptoms. The first, comprising those ulcerations and glandular swellings, appearing upon or in the immediate neighbourhood of the genital organs, in the form of Chancre and Bubo. The second, including ulcerations of the throat, eruptions on the skin, and affections of the eyes, which are frequent sequelæ of the former. The diseases of the bones, and some other deep-seated affections, have been classed by Ricord and other recent writers as *tertiary* symptoms.

The nature of the poison producing these various affections

has been matter of anxious inquiry, but this inquiry has not enabled us to fix upon any thing very specific in its nature, and even the very first effects produced by it are by no means uniform. The varying character of the primary sore, in different individuals, has occasioned endless perplexity—a perplexity which has not been removed even by Mr. Carmichael's supposition of the existence of a variety of syphilitic or syphiloid poisons; "for," as Dr. Hennen has well observed, "soldiers are gregarious in their amours; and we have frequently several men in hospital at the same time, infected by the same woman, some of whom have had one kind of sore, some another, and some both." Neither are these appearances satisfactorily solved by reference to peculiarities of constitution, or to peculiar states of health, because no explanation on this principle would account for a man having, at the same time, upon the penis, two or three different kinds of ulcers, apparently arising from the same cause—an occurrence which my own experience does not permit me to doubt. And although I am disposed to believe that difference of texture, perhaps more than any other circumstance, modifies the appearance of these sores, yet even this will not afford a satisfactory explanation of their varieties. "We have had," says Dr. Hennen, "frequent opportunities of remarking two or more sores of different kinds existing at the same time—an irregularly-shaped diffused sore—an elevated sore, covered with a light-coloured slough—a groove or streak along the glans, as if made with a scraping instrument—and the true and perfect chancre of Mr. Hunter, or the true syphilitic ulcer of Mr. Carmichael. This last has, in some cases, occupied the glans; in some the prepuce; while sores of another description have been on the same part close beside it."

As we must have frequent occasion, in the course of the following remarks, to refer to Mr. Hunter's definition of chancre, I shall, before going further, give his own description of it:—After observing that the inflammation of the glans, which is productive of chancre, like most other inflammations which terminate in ulcer, begins first with an itching in the part, "the itching," says he, "is gradually changed to pain; the surface of the prepuce is in some cases excoriated, and afterwards ulcerates. In others, a small pimple or abscess

appears on the glans, which forms an ulcer. A thickening of the part comes on, which at first, and while of the true venereal kind, is very circumscribed, not diffusing itself gradually and imperceptibly into the surrounding parts, but terminating rather abruptly. Its base is hard, and the edges a little prominent." This, which in the time of Mr. Hunter appears to have been the more common form of venereal ulceration, and which he states to have occurred to him, in proportion to the cases of gonorrhœa, as one to four or five, has now become comparatively rare; "while," says Mr. Carmichael, who was one of the first and most zealous in his endeavours to classify the different forms of ulcerations of the genitals, "so common is the occurrence of those ulcers, which have not the characteristic marks of chancre, that if I were to estimate their relative frequency from my own experience, I would, at the lowest computation, infer that we meet with five cases of these disorders for one of true syphilitic chancre; and my opportunities have been such as enabled me to observe, not merely the trivial, but those which would be esteemed the most malignant cases." And upon a careful comparison of an infinite variety of cases, he finds reason to conclude, that there are six species of primary pseudo-syphilitic disorders.—1. A superficial ulcer, with elevated edges, but without induration, sometimes displaying a whitish and at others a reddish-brown surface, without any appearance of granulations. 2. An ulcer, which is destitute not only of induration but of elevated edges. In general it is raised above the surrounding skin, and exhibits a smooth surface, but without granulations, and has a somewhat fungous appearance. 3. An excoriation of the glans penis and internal surface of the prepuce, attended with purulent discharge. 4. Gonorrhœa virulenta. 5. The phagedænic ulcer, which, as its name implies, has a corroding appearance, and neither exhibits granulations nor surrounding induration; it spreads sometimes with rapidity, causing the most extensive havoc in the course of a few days. 6. The sloughing ulcer, which commences by a small black spot resembling a grain of shot, both in colour and size, and which may be recognised as a slough or mortification extending to some depth below the surface.

With reference to the above classification of Mr. Car-

michael, I would observe, that while I have been able to recognise his different species of ulcer in practice, I have seen an infinite variety of each of these species, and every one of them may be seen varying in degree. There are many ulcers which possess characters differing from all of them, and there are numerous ulcerations of the genitals which exhibit in different parts of their circumference the character of different ulcers—one part of the base may be callous and indurated like the true syphilitic ulcer; another part of the same ulcer may have its edge elevated without induration; and in a third part, the edge may be neither callous, indurated, nor elevated. Nay, I have seen one edge of a sore excavated, while another was putting forth protuberant granulations. I admit, indeed, that these variations in different parts of the same ulcer, are only to be seen when that ulcer is of a larger size than the one generally described as a true chancre; but when nosological definitions come to rest upon the greater or less extent of a sore, I am afraid that they cannot be very safely adhered to; particularly if an adherence to such definition is to imply a decided difference in the mode of treatment. With regard to Mr. Hunter's definition, which has been so much dwelt upon, and which has been adopted by Mr. Carmichael as characterising the effects of the true syphilitic poison, I have no doubt that it may be artificially imitated, particularly by the use of potass, and perhaps by the application of a variety of substances. In short, where these ulcers assume such a variety of appearances, instead of cavilling about what is, or what is not a chancre—a point upon which we can scarcely find two surgeons agree—I would either lay aside the use of this term altogether, or employ it as a generic instead of a specific term.

In 1819, the late Mr. Evans, surgeon of the 57th regiment, published the first part of a work on ulcerations of the genitals, which I regret has not been completed. In this work a classification was attempted upon a very extensive scale, embracing a division of these ulcers which has been too much overlooked—into those from sexual intercourse, and those arising from other causes, to which, be it recollected, the penis is equally liable with other parts of the body. Of the former class, those following impure connection, whether they be sup-

posed to arise from one specific virus, or from a variety of poisons, they are found to be more modified in their appearances by the site and texture of the parts they occupy, than by the peculiar nature of the source from which they originate. Thus, ulcers on the external integuments have often round callous edges, level surfaces, and but little induration of base. Ulcers on the internal membrane of the prepuce are generally either superficial or elevated, their edges sometimes regularly defined, sometimes spreading out like excoriations, but their bases in general little indurated. Ulcers on the body of the glans are often excavated, but little indurated at the base. Ulcers immediately behind the corona glandis, are in general highly irritable, deep, scooped, indurated in their edges and base. Ulcers on the frænum generally follow lacerations of that part, have bases considerably indurated, and are often slow in healing.

Some years ago a series of very interesting experiments was made in Paris upon the subject of venereal poisons, and for the following account of these experiments and observations, as well as of their repetition here, I am indebted to Dr. Simpson, the professor of midwifery, and formerly my colleague in the Lock Hospital. "For these few years past, Dr. Ricord, surgeon to the Venereal Hospital at Paris, has been engaged in performing an extensive series of experiments upon the different varieties and forms of venereal poison, that promise, when they are fully completed, to clear up several questions on which there at present exists much difference of opinion, and that have already added some new and interesting facts with regard to the diagnosis and pathology of syphilitic affections. Ricord, following out the fact noticed by Hunter, of the inoculability of syphilitic matter, has in several hundred instances, and under a great variety of modifications, introduced, by slight lancet and leech wounds, beneath the epidermis of the thigh, and of other parts of the body of those already affected, matter taken from their own ulcers, and buboes, and from their gonorrhœal discharges, ulcerated tubercles, &c. When the matter thus inoculated is taken from a chancre or true syphilitic ulcer, the wound in the thigh quickly inflames; and, in the course of the second or third day afterwards, there is found in the site of the wound

a specific characteristic pustule, having an areola like that of cow-pox; and on the fourth or fifth day a depressed or umbilicated centre. About the fifth or sixth day, the surrounding tissue becomes hardened and infiltrated with coagulable lymph, and the pustule soon afterwards shrinks and gets gradually covered by a conical stratified crust. On this crust separating, a circular or elliptical ulcer, with an indurated base and raised rounded edges, is left. The matter from this pustule, or the ulcer which follows it, will, by inoculation, furnish in its turn a similar pustule and chancre, and in this way successive generations of them may be kept up.

"Dr. Ricord has produced one and the same characteristic syphilitic pustule by inoculation with the matter of all different forms of chancre, as well as with that of open buboes, in which the proper substance of the glands was affected, and which he looks upon as chancrous inflammations seated in glandular tissue. On the other hand, he alleges that he has found the inoculation of the matter furnished by buboes, consisting only of suppuration of the cellular tissue lying around the gland, not to be followed by any such result;—and the same is true with respect to the matter furnished by simple mechanical abrasions, by the vesicles of herpes, &c. The matter of gonorrhœa also, according to very numerous trials, proved perfectly incapable of giving rise to the peculiar pustule; and in those cases of this disease in which the gonorrhœal matter at first appeared to possess inoculable properties, chancrous ulcers were always detected, on careful examination with the speculum, in some of the deeper and more concealed parts; as high up in the vagina and upon the neck of the uterus in the female, or in the canal of the urethra of the male.

"From the whole of his numerous investigations, Dr. Ricord is inclined to conclude that chancre can only be produced by the application of the secretion of a previous chancre, and never results from the contact or inoculation of a simple gonorrhœal discharge,—the matter of chancre and of gonorrhœa being specifically distinct. Indeed, in his own public and private practice, he is constantly in the habit of employing inoculation as a means of correct diagnosis, and consequently of correct practice, in cases where genital sores are only of a

suspicious nature, or have lost their primitive characters; as well as in instances of gonorrhœa in which there existed phymosis, or where he suspects the presence of deep-seated and concealed chancres. He believes that (if we except the subsequent supervention of secondary symptoms) the only true test which we have for a sore upon the genital organs being actually syphilitic, is the possibility of producing the characteristic pustule by inoculating from it; and when thus used as a diagnostic test, the pustule may be effectually destroyed by caustic on the third or fourth day after its appearance, or before the surrounding induration appears." I may add that Ricord is said to hold an opinion, of the accuracy of which my own experience leads me to entertain great doubts, viz., the impossibility of a second occurrence of syphilis in the same individual.

In the Lock Hospital of Edinburgh, Ricord's experiments upon inoculation from primary sores, were repeated in a number of instances, and with nearly the same results. One of the principal points which has been hitherto ascertained by them is, that chancres of a true syphilitic character, according to Ricord's test, may heal under the simplest treatment in the course of a very few days, and consequently, that the shortness of time an ulcer upon the genital organs remains open, does not furnish, as has been sometimes supposed, a proper criterion of the non-syphilitic nature of that ulcer.

This may be the proper place to notice the peculiar opinions relative to venereal contagion, of another distinguished French writer, Devergie, the author of a splendid work entitled "Clinique de la Maladie Syphilitique," of which opinions the following summary is given in a translation of one of Devergie's works, by Mr. Innes:—"1st, that the contagious principle does not always produce the same symptoms; 2d, That syphilis may be developed in sound persons under particular circumstances, by the abuse of coition; 3d, That syphilis does not belong exclusively to the human race; 4th, That venereal diseases may be cured almost by the sole power of nature; 5th, That ulcers accidentally produced on the sexual organs, have not any mark to distinguish them from those contracted by impure coitus, and that they may also give rise to secondary affections termed constitutional; 6th, That it is a serious

error to make use of the expression of general infection to distinguish the secondary affections termed constitutional; 7th, That it is extremely rare to find a syphilitic diathesis, in which all the system suffers the disorder produced by the contagion, and that, consequently, hereditary syphilis ought to be ranked in the history of rare cases."

In attempting a classification of venereal ulcers, with a view to their treatment, which is the essential object of all classification, I would observe, that while I believe they will, one and all, recover without the use of mercury, yet I am persuaded, notwithstanding all that has been alleged to the contrary, that the cure will frequently be promoted by the moderate use of this mineral; and that its good effects will be most conspicuous in the Hunterian chancre, and in the others, in proportion as they approach nearer in character to this. Thus, assuming Mr. Carmichael's arrangement, I believe, that in cases of what he terms the true syphilitic ulcer, and in the first two of what he terms the pseudo-syphilitic sores, recoveries will, for the most part, be promoted by the use of mercury, and what is of the utmost consequence, secondary symptoms will, in my opinion, be very frequently obviated. In the next two of Mr. Carmichael's pseudo-syphilitic diseases, excoriations, and gonorrhœa, no one, in this country at least, will, I believe, contend that mercury is useful, much less necessary. I say in this country, because Lagneu, an eminent French writer on this disease, inculcates the identity of the gonorrhœal and syphilitic poisons, and the necessity of mercury for the cure of both. In the two kinds of ulcers of the genitals last described by Mr. Carmichael, the phagedænic and sloughing ulcers, mercury is greatly injurious. Upon the general employment of mercury in the treatment of syphilis, it will be necessary to enlarge hereafter; in the meantime I may again remark, that I consider mercury useful in Mr. Carmichael's true syphilitic ulcer, and in his pseudo-syphilitic ulcers of the first and second species; in excoriations and gonorrhœa altogether useless; and in his phagedænic and sloughing ulcers positively and uniformly hurtful.

With reference to this point, I made the following observations in a Probationary Essay on Syphilis, submitted to the Royal College of Surgeons here in 1820, no one word of which

do I now see reason to alter:—"To Mr. Carmichael we are under great obligations for his description of the phagedænic and sloughing ulcers of the genitals, and for his observations on the injurious effects of mercury on their treatment; but the practical utility of his other subdivisions of primary venereal ulcers, does not, I confess, appear to me by any means so obvious; and if in any instance we have introduced too much refinement into the diagnosis of disease, it is, I apprehend, in the case before us. In affections of the internal organs, the mistaking disease of one viscus for that of another, may, in many cases, be productive of the most serious evils; but in the case of external ulcers, cognisable by the sight and by the touch, seated upon the same parts of the body, occupying the same texture, originating in the same way, and so much alike that they are liable to be confounded with one another, even by a cautious observer, I will venture to assert, that the same or similar remedies are likely to prove beneficial; and that, for all practical purposes, the necessity of a very minute diagnosis is done away.

"As the characteristic of the Hunterian chancre—'the circumscribed hardness of the edge and base'—is admitted to vary in degree, and as this hardness may be shaded down until it becomes nearly undistinguishable, I think it advisable not to confine ourselves too rigidly to this definition in regulating the mode of treatment; particularly if we are to exclude from the beneficial operation of mercury all ulcerations of the genitals which do not decidedly possess the Hunterian characters of chancre; for my experience convinces me that the cure of many of these ulcerations will be expedited by mercury, when a circumscribed hardness of the edge and base does not exist in any remarkable degree."

In ulcerations of the genitals, the local treatment must, of course, depend much on the characters which they exhibit. In many cases they have been treated most successfully by simple ablution, so as to keep the parts clean, and by covering them with lint, or the most mild and unirritating dressings; in other cases, astringents, stimulants, or escharotic applications become necessary. One of the most common and useful lotions is the black wash, the Lotio hydrargyri submuriatis nigra, of the pharmacopœia chirurgica, made by agitating a

quantity of calomel in lime water. The Ungt. oxyd. hydrag. rubri, and the Ungt. subacetat. cupri, are the most useful remedies of an unctuous character. But in the application of these and of all other stimulating remedies usually applied by means of lint, it is necessary to caution patients to confine them as much as possible to the surface of the sore. I have often seen the healing of sores, particularly within the prepuce, greatly retarded by stuffing the parts with dossils of lint, stretching them out of their natural position, and thus keeping up a continued irritation. In the application of caustic to primary venereal sores, my practice was long guided by the following statement of Mr. Benjamin Bell. "Of forty-eight patients with chancres in an incipient state, and exactly as they occurred in practice, one-half was treated in the manner that I have mentioned, by destroying the chancres with caustic immediately on my being desired to see them; while all the others were put under mercury for eight or ten days before caustic was used. In every other circumstance the method of treatment was the same. The difference, however, surprised me greatly. Of the twenty-four treated with the immediate application of caustic, twenty were seized with buboes, while only three buboes occurred in an equal number to whom mercury had been previously administered."

Of late years, however, I have been in the habit of at once destroying the surface of these sores by caustic, when of a limited extent, and this practice now, I believe, generally followed, has for the most part been highly satisfactory; nor would I be justified in saying that it has produced buboes in anything like that proportion which Mr. Bell's statements would lead us to expect. The various degrees of indolence or irritability with which primary venereal ulcerations are accompanied, will render the more or less stimulating of the foregoing applications preferable; and the same circumstance will suggest the propriety of occasionally varying the proportions of their component parts. It will also be observed, in the treatment of these sores, that an application which, in the first instance, appears to be highly useful, soon loses its effects from the parts becoming habituated to the same stimulus: and whenever the healing process seems to be at a stand under one remedy, it is, in general, a sufficient ground for

changing the application. In the phagedænic and sloughing ulcers of Mr. Carmichael, mercury, as already observed, is highly improper. These ulcers are generally attended with much constitutional excitement, frequently, in young soldiers, requiring in the early stages bleeding and the most decided antiphlogistic regimen. As local applications, anodyne fomentations and cataplasms, or stimulating lotions, are, according to circumstances, the most useful; and of the latter class, diluted nitric or muriatic acid, solutions of the oxymuriate of mercury, and of the chlorurets of lime and of soda are the best.

Venereal buboes, the next symptom which demands our attention, although sometimes sufficiently perplexing in their treatment, do not afford the same endless variety in their appearances which we meet with in chancres or primary syphilitic ulcers. A venereal bubo has been defined to be "a painful swelling of a lymphatic gland produced by absorption of the venereal virus." In most cases, the first indication of the formation of a bubo is a sense of weariness, stiffness, and pain in the groin, sometimes accompanied with numbness in the thigh of the affected side. Upon applying the fingers to the part, one of the inguinal glands is found to be somewhat swollen. These tumours are for the most part at first readily movable under the skin, but as the swelling increases, the integuments naturally become more tense, and the tumours more stationary and more painful. The only tumours with which the venereal bubo is likely to be confounded, are scrofulous enlargements of the glands of the groin, swellings of the same glands originating from gonorrhœa, termed sympathetic buboes, and tumours originating from ulcerations and cutaneous eruptions on the lower extremities. Lumbar abscesses and herniæ, both inguinal and femoral, are said to have been mistaken for venereal buboes; but this is a mistake so obviously the result of ignorance or inattention that I do not conceive any practitioner of common judgment likely to fall into it.

Between the true venereal and the scrofulous bubo I regret to say that we do not possess any adequate means of distinction. The former, however, is in general confined to one gland, is exceedingly painful to the touch, is in general rapid in its progress, and attended with considerable inflam-

mation of the integuments. Now, in scrofulous affections, tumours are frequently distinguishable in more than one of the inguinal glands, and occasionally also in other parts of the body. These tumours are much less painful; they are more movable under the integuments; their progress is slower, and attended with less inflammation on the surface; at the same time they frequently acquire a much larger size than what the venereal bubo reaches. In cases of gonorrhœa, when the inflammation runs high, and when the habit is irritable, swellings frequently occur in the glands of the groin, which are difficult to be distinguished from syphilitic buboes: they are chiefly to be known by the absence of chancres, and by observing whether or not they correspond in their origin, progress, and decline, with the extent of the urethral inflammation. Ulcerations and cutaneous eruptions on the inferior extremities, sometimes give rise to enlargements of the glands of the groin, which are to be distinguished from venereal buboes, by our knowledge that such ulcerations exist, by the total absence of other venereal symptoms, and by observing that such tumours are frequently seated lower than venereal buboes, and more directly on the fore part of the thigh.

Whenever our assistance in the treatment of venereal buboes is required at a period sufficiently early to render their cure by resolution practicable, we are to attempt the discussion of every tumour of this kind. Although I am by no means prepared to assert that mercury is necessary for the cure of the present symptom, more than for that of chancre, and although I believe that it will in general have less influence upon the local affection in cases of bubo than of chancre, yet, looking upon bubo as one step farther towards a constitutional affection, and believing that a course of mercury may be instrumental in superseding this affection, I cannot but consider it often eligible in the treatment of this symptom, particularly when the bubo is of a chronic or indolent disposition. Combined with this, every part of the antiphlogistic regimen is to be employed, and every topical means used for the dispersion of the tumour. Of these the most efficacious are topical bleeding by leeches, warm fomentations, or sedative and astringent lotions. An objection has indeed been offered to leeches as tending to induce a chronic state of the swelling

and tedious cure, but I cannot say that I have observed the force of this objection in the treatment of buboes amongst young and vigorous soldiers. In some instances pressure by means of compress and bandage has been employed for the dispersion of venereal buboes; and I have in my possession a report from Dr. Mahony, formerly surgeon of the Royal Fusiliers, in favour of this practice. I had also an opportunity of seeing it employed successfully in Edinburgh Castle several years ago by Dr. Logan then of the 53d regiment; but my own experience of this mode of treatment is scarcely sufficient to enable me to pronounce a positive opinion on its value. When suppuration becomes inevitable, fomentations and cataplasms are the applications naturally resorted to, and when matter is once formed, the sooner an opening is made for its exit the better. If the suppuration has advanced rapidly, and the integuments are not much altered, this is best done by the lancet; if, on the contrary, the suppurative process has been long protracted, and the integuments much thinned, caustic is the preferable means of making an opening.

In speaking of the diagnosis between venereal buboes and scrofulous swellings of the glands, I pointed out the torpid and indolent nature of the latter as their chief characteristic; and in practice we must be prepared to meet with tumours of a mixed nature, evidently originating from a venereal infection, while in their progress they seem more akin to the scrofulous bubo; remaining for days, and sometimes for weeks, quite stationary, without showing a decided tendency either to resolution or suppuration. This is a most tantalizing occurrence, particularly in private practice, where the surgeon is constantly teased to say what is to be the result of these swellings; but I am happy to think that we possess a remedy which will, in a majority of such instances, procure the discussion of the tumours, and in all of them will certainly expedite their termination either in resolution or in suppuration—blisters to the surface. After having long employed this remedy and often urged it upon the attention of my medical friends, I was very happy to find my views of its efficacy confirmed by the following recommendation of it from a gentleman of Mr. Carmichael's talents and experience. "The buboes in this form of venereal disease are often remarkably hard and indolent.

evincing neither a tendency to disperse nor to suppurate. In such cases the greatest advantage may be derived from the repeated application of blisters to the indurated bubo, which soon either cause the dispersion or the suppuration of the tumour, and thus free the patient from a troublesome symptom which might otherwise continue many months to torment him."

The more prominent symptoms which mark the advanced stages of the venereal disease, or what are denominated secondary symptoms, are ulcerations of the throat, eruptions on the skin, and nodes, or caries of the bones. These, when they occur in the same individual, appear frequently, but by no means uniformly, in the succession in which I have now enumerated them. A very remarkable symptom, first noticed I believe by Ricord, has been observed in numerous cases of secondary syphilis—I allude to small glandular swellings on the back of the neck; and although altogether unable to offer any satisfactory explanation of this occurrence I cannot doubt of its existence, having had some cases of it recently pointed out to me by my colleagues in the Lock Hospital here.

Venereal ulcerations of the throat are perhaps as difficult to characterise satisfactorily as the original primary ulcer; and we ought never to forget how liable the tonsils are to inflammation and ulceration in many individuals, from causes altogether independent of the absorption of the venereal virus. The high degree of inflammation, however, with which such ulcerations are preceded or accompanied, when they originate from cold, or other ordinary causes, constitutes an important feature in the diagnosis; for while, in such cases, the pain and general swelling of the fauces attract the patient's early attention, he is at the same time harassed with inflammatory symptoms in the constitution more or less severe. In venereal affections of this part, on the contrary, the disease is attended with little constitutional excitement, little tumefaction, or difficulty of deglutition, and has for the most part ulcerated before it attracts the patient's attention. This ulceration has been peculiarly characterised by Mr. Hunter, "as a fair loss of substance, part being dug out as it were from the body of the tonsil. It has a determinate edge.

and is commonly very foul, having thick white matter like a slough adhering to it, and not admitting of being washed away." This has generally been considered as a correct description of the true syphilitic sore throat; and as far as appearances alone can guide us, without adverting to the history of the case, may be safely trusted to.

The period of occurrence of such ulcerations is extremely uncertain. In some instances they are said to have appeared within ten days from the date of the appearance of a primary sore; and when they follow as a direct consequence of such sores, they appear more early than when buboes have intervened. In the latter case, weeks, nay months, sometimes elapse after the primary symptoms have disappeared before the throat becomes affected. In the treatment of this affection, when appearing in the pure unmixed form described by Mr. Hunter, the rapid and beneficial effects of mercury are perhaps more conspicuous than in most other cases; but when accompanied, as it not unfrequently is, with a surrounding erysipelatous inflammation, mercury is highly calculated to aggravate this symptom, and to lead to extensive sloughing and destruction of parts. It must therefore be withheld until all inflammatory symptoms have subsided under the use of abstemious diet, purgatives, antimonials, warm bath, &c. "In affections of the throat," says Dr. Hennen, "I would be more guarded than in any others in the employment of mercury, until all inflammatory disposition was removed; after that I have seen them yield as if by magic, so soon as the local effects of the mercury on the parts within the mouth become obvious." A recollection of these local effects of mercury on the salivary organs will readily explain the irreparable mischief sometimes occasioned by its exhibition in venereal sore throats, when, instead of their usual indolent features and slow progress, they are attended with erysipelatous inflammation, and a tendency to sloughing.

Venereal eruptions, as Dr. Bateman justly observes, assume such a variety of forms that they bid defiance to any arrangement founded upon their external characters, and, in fact, they possess no common nor exclusive mark by which their nature and origin are indicated. There is, perhaps, no order of cutaneous appearances, and scarcely any genus or species

of the chronic eruptions, which these secondary symptoms of syphilis do not occasionally resemble. The cutaneous eruptions, now so common as sequelæ of syphilis, were, during the several years that I served as a regimental surgeon, so comparatively rare under the general use of mercury, that I do not pretend to be able, from my own observation, to point out by what marks of discrimination they are to be distinguished from eruptions arising without any suspicion of a syphilitic taint; and this is an acknowledgment in which I am fully borne out by Dr. Hennen and others who have had the best opportunities of attending to and studying the appearances of these eruptions. The more determinate eruptions are papular, pustular, scaly, or tubercular, besides which there often occurs a general, diffused, reddish, mottled efflorescence of the skin, resembling the "roseola annulata" of Willan, and which the soldiers themselves denominate "trout back."

Mr. Carmichael, who paid most particular attention to this subject, conceived that certain characters of the primary sore were always succeeded by certain determinate forms of eruption. Thus, he asserts that the eruption following the true syphilitic sore is always of a scaly character, while he avows that he has not, in any one instance, observed the eruption to be papular, pustular, or tubercular, where it arose from the true syphilitic primary ulcer, or to be scaly where it followed those ulcers which do not possess the characters of chancre—the indurated edge and base. Mr. Carmichael has made some observations on the particular sites and appearances of this scaly eruption, which my own observations enable me to confirm, and which are deserving of attention. The scaly syphilitic eruption is almost in every instance to be found on the forehead, breast, back of the neck, on the groins, or adjoining surface of the pubis. On the back of the neck and groins, those spots situated near the parts covered with hair, spread into each other so as to form extensive copper-coloured blotches. When the eruption affects a portion of skin opposed by another skin, as between the nates, or between the scrotum and thigh, or under the arms, or between the thighs, it is not scaly; but the skin becomes elevated into a moist, soft, flat, or somewhat convex surface, which discharges a whitish matter. These are the appearances which I believe authors have termed condy-

lomata, fici, cristæ, maricæ, &c.—denominations applied according to their figure, or perhaps the fancy of the practitioner. On the subject of condylomata, a very interesting paper has lately emanated from the pen of Dr. Skae, formerly my colleague in the Lock Hospital here, who gives strong grounds for believing that this is a primary and peculiar form of disease, identical with *sibbens*, and curable for the most part by local applications.

The opinion that peculiar forms of eruption succeed peculiar descriptions of primary sore, is not supported by the general testimony of surgeons, and, indeed, it must be admitted that the same primary ulcer is sometimes succeeded in the same patient by eruptions of several different sorts either existing together on various parts of the body, or breaking out in succession. Dr. Hennen assures us that he has frequently observed eruptions of the same nature and character to succeed to the foul indurated excavated ulcer, and to the simple excoriation. "In fifteen cases of eruptions, unaccompanied with any other symptoms, which succeeded the Hunterian sore, six were tubercular, five exanthematous, two pustular, one tubercular and scaly, and one tubercular and vesicular. In twelve cases following the non-Hunterian sore, and in which eruptions were the only symptoms, six were pustular, three were exanthematous, two were tubercular, and one was tubercular and scaly." These statements are sufficient to show the uncertainty of the occurrence of any particular form of eruption, after any given appearance of the primary sore, and this is still farther confirmed by the following general inference stated by Sir J. M'Grigor and Sir W. Franklin, as the result of the reports transmitted to them by the great body of the army surgeons, in reply to certain queries proposed with a view to the establishment of several important points in the treatment of the venereal disease:—"1. That of 1940 cases of primary venereal ulceration on the penis treated without mercury, 96 have had secondary symptoms of different sorts. 2. That of 2827 cases of venereal ulcerations on the penis treated with mercury, 51 have had secondary symptoms. 3. It has been remarked, that in cases healed without mercury, iritis has been frequently observed as a secondary symptom, in some instances by itself, in others attended with eruptions of different kinds. 4. That

it appears that no peculiar secondary symptoms are seen to follow from peculiar primary sores."

The investigations made in the military hospitals abundantly prove that all forms of eruption, supposed to be venereal, are curable without mercury, but the beneficial effects of a moderate use of this mineral in the treatment, particularly of the scaly copper-coloured blotches, more especially considered as the genuine venereal eruption, is, I believe, admitted by all practical men. In the other forms of eruption, Mr. Carmichael's practice, whatever may be thought of his theoretical views, is highly judicious. In the papular and pustular forms of eruption, accompanied as they often are with a considerable degree of fever and constitutional excitement, general blood-letting, purgatives, antimonials, warm bath, decoctions of sarsaparilla, and mild diluents are chiefly indicated; and in their more advanced stages, or more chronic forms, alterative courses of mercury and antimony in the very convenient form of the Plummer's pill, will be found greatly to expedite the cure. In an eruption of a tubercular character sometimes terminating in ulcers covered with thick crusts, which Mr. Carmichael considers as more commonly the sequela of his phagedænic ulcer, the same treatment is followed with success; bleeding, abstinence and diluents, if attended with constitutional fever, and mercury in the more chronic stage.

When these eruptive diseases are attended by a less urgent but more continued derangement of the general health, the tongue loaded and furred, and the appetite gone, Mr. Bacot of the Grenadier Guards, the author of some excellent observations on syphilis, has very properly advised us to withhold the regular employment of mercury, until, by proper evacuations and attention to the general health, the patient may have the benefit of a delay, which will sometimes supersede the necessity of farther medical treatment; and he adds, with much truth, "that whatever plan may be pursued, these eruptive phenomena will eventually disappear; but where they continue to linger for a long time, and are attended with their usual accompaniments, languor, debility, and disturbed rest, I neither know, nor can I understand the advantage of delaying that remedy, which repeated experience has taught

me to rely upon—that is, mercury." In the treatment of venereal eruptions, and in other forms of syphilitic disease, the hydriodate of potass has of late been extensively used; and I have seen several cases in which it appeared to be beneficial: but I must confess that my experience of it is not sufficiently extensive to enable me to estimate its value with any precision.

Iritis has already been stated to occur as a secondary symptom of syphilis, and for much valuable information upon this, as well as gonorrhœal and syphilitic inflammations of the eye generally, I must refer to Mr. Lawrence's "Treatise on the Venereal Diseases of the Eye." This is the case of all others in which my experience enables me to speak without reserve of the general utility of mercury. It is indeed, by common consent, allowed to afford one of the best examples of the beneficial influence of this mineral, and, at the same time, to present an instance of disease uncontrollable by the other reputed antivenereal remedies.

Venereal nodes, which succeed to the affections of the superficial or soft parts, are sometimes preceded by long-continued and severe pain in the bones, terminating occasionally in permanent thickening of the periosteum, in solid and considerable enlargements of the substance of the bone, or eventually in caries. The progress of these affections is, however, slower in proportion to the lower degree of organization in the parts concerned; and they generally supervene, at the distance even of months from the date of the primary affection. The true syphilitic node, as this kind of swelling is termed, is a solid enlargement of the substance of the bone, apparently commencing in this texture, and not in its incipient state, nor, for some time afterwards, attended by any discoloration of the integuments. It is in general an indolent swelling, possessing little of the inflammatory character, increasing by slow degrees, and sometimes exciting but little pain till considerably advanced in size. The most common seats of these nodes are those bones, and parts of bones, which lie immediately under the integuments, as the cranium, the clavicle, the sternum, and fore part of the tibia. Swellings of these bones, however, or of the periosteum covering them, occasionally appear independently of a venereal origin;

but in such cases there is, from the commencement, swelling and redness of the integuments, proceeding apparently from without inwards; they are more rapid in their growth, more acutely sensible to the touch, and yield more readily to the common antiphlogistic remedies.

With regard to the origin and most effectual means of treating venereal nodes, I feel more at a loss to speak with confidence than upon any of the symptoms heretofore mentioned; for while, on the one hand, it must be admitted that affections of the bones were noticed as sequelæ of syphilis before the employment of mercury for its cure, yet, on the other hand, there is no room to doubt that such affections have become infinitely more rare since the general abandonment of mercury in the profuse quantities in which it was at one time given. The comparative infrequency of nodes under the non-mercurial practice is, in my opinion, one of the best established and most important facts which the recent investigations have brought to light; and with this fact before our eyes, we cannot venture to urge the use of mercury with the same confidence to which I consider it to be entitled in the earlier symptoms of the disease. But it is quite possible that a moderate share of mercury may obviate the occurrence of a symptom which it may be unable to cure, nay, which, if given in profusion, it may have a tendency to aggravate. I have no difficulty in conceiving that the alterative and deobstruent effects of mercury, if I may be permitted the expression, will remove a cutaneous eruption, while the profuse and continued exhibition of this mineral in cases of periostitis will aggravate this symptom, and lead to caries of the bones. Affections of the bones have been noticed by some of the older writers as occurring only in those cases of the venereal disease which were cured by mercury. On this point the testimonies of Fallopius and Palmarius, referred to by Dr. Hennen, are peculiarly deserving of attention. The former, speaking of the loss of the bones of the nose and palate, in his chapter "De Ossium Corruptione," says, "et sciatis, quod non in omni inveterato gallico hoc fit, *sed tantum in illis, in quibus inunctio facta est cum hydrargyro;*" and Palmarius uses the following remarkable expression:—"Sed hoc iis duntaxat, contingit, qui

olim a lue venerea hydrargyrosi vindicati putarentur, *non qui decocto guaiacino et alexipharmaco curati fuissent.*"

In fine, all that my own experience in the treatment of nodes enables me to say is this, that when they have succeeded to primary venereal sores, in the treatment of which little mercury has been employed, and when they possess an indolent character, with little or no superficial inflammation, the dispersion of these swellings will often be promoted by a judicious course of mercury, confinement within doors, warm bathing, and attention to the general health, with the local use of leeches, blisters, and stimulating liniments, one of the best of which is the camphorated mercurial liniment of the Pharmacopœia Chirurgica. But when nodes appear in a very advanced stage of the disease, when mercury has been given irregularly or profusely, when the constitution is broken by dissipation or maltreatment, we must be exceedingly guarded in the use of mercury, and our efforts must be chiefly directed to the restoration of the general health, treating the local symptom according to its inflammatory or indolent character by soothing or stimulant applications. The following sentiments of Mr. Carmichael upon this point are peculiarly worthy of attention :—"It must be allowed that syphilitic nodes by no means yield to mercury with the same regularity and quickness as the constitutional affections of the surface of the body—a circumstance most probably owing to the organization of the bones, which is so low that the strongest mercurial action in the skin and throat may be accompanied by a very weak one in the vessels of the former. Yet, in the most obstinate instances, I doubt the propriety of continuing a full mercurial action longer than two months. This period is more than sufficient to supersede the syphilitic action if the course is managed with judgment. I have always found it unnecessary to persevere in the use of mercury until the tumour of the bone is entirely removed. And there can be no doubt that if the node remains after a judicious course, we should regard it merely as a simple enlargement of the bone, deriving no character whatever from its syphilitic origin."

Having now enumerated in succession the more characteristic symptoms of the venereal disease, both primary and secondary, and having endeavoured to point out concisely what

appears to me the most eligible treatment, I would recapitulate the leading points of that treatment. In primary venereal ulcers, when of a very recent date, and of a limited extent, my practice has been to destroy them immediately with caustic; by which I have frequently succeeded in superseding the necessity of any farther treatment. When these sores are more extensive, and of longer standing, when they offer nothing characteristic in their appearance, but present a clean and indolent surface, I adopt the same local application, and consider it in some measure a matter of option whether the patient shall or shall not take mercury. I warn him, however, that in the event of his adopting the latter mode of cure, although the primary sores may be healed without much loss of time, he runs a greater risk of a subsequent eruption, or other constitutional symptoms. Where ulcers again present a foul surface, with induration of the edge and base, approaching to Mr. Hunter's description of chancre, I consider it my duty to urge the patient to submit to a mercurial course, as a means of promoting the cure of the primary sore, and of guarding his constitution from a secondary affection.

In short, for a long time back, I have been strongly impressed with the opinion, and have been in the habit of stating it in my class, that the more speedily we can cure the primary sore, by whatever means, whether with or without mercury, the more likely we are to prevent any constitutional affection. In confirmation of this, I have been much pleased with a statement of Ricord's, who asserts that no authentic observation exists of ulcers destroyed before the first five days, giving rise to secondary symptoms. It is a remarkable fact, established by the general returns from the army hospitals already referred to, that of patients treated without mercury, one-twentieth have had secondary symptoms, while of those whose primary sores were cured under the use of this mineral, only one-fifty-fifth have had secondary symptoms. When ulcers are accompanied with much inflammation, where they show any disposition to phagedæna or sloughing, I consider mercury positively forbidden, at least in the first instance; and the inflammatory symptoms are to be met by local or constitutional antiphlogistic remedies, according to their severity. In the treatment of buboes, I recommend mercury more with

a view to protect the constitution, than from any decided influence it seems to possess on the local affection. The treatment of these is to be conducted upon the same principle as that of other glandular swellings; but I cannot help again adverting to the beneficial effects experienced from blisters in the indolent state of buboes.

In the treatment of ulceration of the throat, possessing an indolent, and what has been considered the true venereal character, mercury will be found to operate most beneficially; but when much inflammation of an erysipelatous character exists around the ulcer, it is to be carefully withheld. Cutaneous eruptions for the most part yield readily to the combination of calomel and antimony, in the shape of the Plummer's pill, when in a chronic form; in their earlier and more acute stages, they frequently require bleeding, warm bathing, and purgatives. In the treatment of iritis, mercury is, in my opinion, indispensable. In affections of the bones, perhaps more than in any other instance, much mischief has been done by the indiscriminate and profuse employment of mercury. These swellings will, however, when they originate without the previous abuse of mercury, often be discussed under the employment of this mineral. When they originate in broken constitutions, and after a variety of complicated treatment, we must chiefly expect relief from an improvement of the general health under judicious regimen and wholesome air. From the preceding observations, it will be seen that I consider mercury, in certain circumstances, applicable to nearly all the symptoms of the venereal disease; but this is a very different thing from considering it, as I once did, to be a *sine qua non*, and altogether indispensable. I am now well aware how much may be done by prompt attention, and the early employment of simple antiphlogistic measures, to expedite the cure of primary venereal ulcerations, to supersede the occurrence of secondary symptoms, and to obviate those formidable consequences to individuals, and to the service, which have often been the result of the heedless and indiscriminate use of mercury.

Of all the evidence which I have obtained in favour of the non-mercurial treatment, perhaps the most satisfactory is that furnished to me by the late Dr. Pitcairn of the 5th Dragoon Guards. I have been favoured by this gentleman with a series of

consecutive Returns, embracing in all, 768 cases of ulcerations of the genitals, treated in the 58th regiment, in the 4th dragoons, and in the 49th regiment. These cases have invariably been treated without the exhibition of mercury, and not a single instance of secondary symptoms appears in the hospital registers. This very remarkable success is attributed by Dr. Pitcairn, no doubt very justly, to the fact, that a military medical officer has, or ought to have, only recent cases brought before him. Acting upon this principle, enforcing frequent inspections, rigid attention to cleanliness, using the common local washes, particularly solutions of the sulphate of zinc, regarding, in short, the local treatment as being "by far the most important, especially in recent cases, such as we find them in a regiment," Dr. Pitcairn has succeeded in obtaining the foregoing very satisfactory result. The iodide of potassium seems to have been the only one of the reputed antivenereal remedies used to any extent, and is said to have been "frequently beneficial." Of the various preparations of iodine which have of late been so much used in the treatment of the venereal disease, I must confess that my own experience is comparatively limited. I have not been altogether able to divest myself of my early prepossessions in favour of mercury, and I have perhaps been in some degree prejudiced against its substitute from the endless variety, and incongruous nature, of the complaints in which iodine has, of late years, been so indiscriminately and so confidently recommended. It is only since Sir Astley Cooper's visit to Edinburgh in 1837 that my attention has been directed to the effects of this medicine. He then prescribed it for two private patients of mine, labouring under tertiary syphilitic symptoms, with good effect, since which I have used it repeatedly, particularly in the eruptive forms of the disease, and in such cases I have seen reason to think favourably of the hydriodate of arsenic and mercury—a preparation strongly recommended by some of the most eminent of the Dublin surgeons. In the sixty-first volume of the Edinburgh Medical and Surgical Journal will be found a valuable paper by Dr. Hocken, on the Comparative Value of the Preparations of Mercury and of Iodine in the treatment of Syphilis, and in which the author comes, in my opinion, to a very just estimate of their respective merits. It is in the primary and secondary

symptoms that the modified and regulated employment of mercury is obviously beneficial, while in many of these symptoms the iodide of potassium is inert or useless. In tertiary symptoms, again, following Ricord's division, "iodine is far more valuable than mercury."

In giving a general recommendation of mercury for the cure of venereal complaints, I am not guided solely by my own experience, which has been perhaps too generally, and was for a long time too exclusively, on one side of the question, to enable me to form an accurate comparison. But recollecting that for many years of my life I was in the habit of seeing at least from ten to twenty venereal cases daily; recollecting that these cases were almost uniformly treated with mercury, and recollecting only one instance of death from this disease where the treatment from first to last fell under my own observation, I am naturally led to look upon mercury as very generally successful in the cure of syphilis. Let me not, however, be misunderstood. I renounce the idea of holding out mercury as a specific, for in what have been called specifics no confidence is to be placed. I do not contend, as some have done, for the absolute necessity of this medicine in the cure of the venereal disease, and have ever held it absurd to assert that this individual medicine—so peculiar in its character and limited in its production—that this and this alone should be capable of curing a disease so Protean in its shapes—so widely diffused over the surface of the globe—affecting every texture of the body—incident to the natives of every country, and of every clime, of every colour and of every constitution. I equally renounce the idea of recommending for the cure of the venereal disease, those violent and long-continued salivations which custom, prejudice, and ignorance used formerly to sanction, "when it was believed that the venereal disease uniformly ran on to a fatal event, if not checked by mercury, and when the medicine was in consequence pushed with an unsparing hand, until the patients were seen with their ulcerated tongues lolling out of their mouths, their faces enormously swollen, the saliva running out in streams, and the surgeon in some degree marking the progress of the cure by the number of pints evacuated daily."

The idea of recommending mercury on the ground of its

being always beneficial and universally harmless, I have never entertained, for in remedies recommended on such grounds I place no confidence; but that mercury is not guilty of all the evils which have been laid to its charge I think I have good grounds for believing. When I reflect upon some thousand cases, both of syphilis and of liver disease, in which I have employed mercury with a hand perhaps too unsparing, and when I think of the health which many of my patients have afterwards enjoyed, I cannot believe that there is any great proportion of human constitutions upon which this medicine exerts the deleterious effects which have been ascribed to it. Did I consider it necessary to go at large into this point, and to analyse the writings of the late Dr. Watt of Glasgow, and Dr. Curry of Guy's Hospital, I could show cause to believe that many constitutions have been improved as well as injured by the use of mercury. With the last-mentioned author I am quite ready to admit that, like antimony, opium, and every other active remedy, mercury would probably do little good if it were not also capable of doing much harm. "The knife and the caustic are unquestionably powerful, and in so far may be made dangerous instruments; but who ever blames the surgeon for employing a sharp knife or an active caustic? or who would be so absurd as to expect that the couching needle and the scalpel which perform such wonders in the hands of an expert oculist and dexterous lithotomist, can be used with equal safety and success by any clumsy or inexperienced person who may fancy himself equal to the task of using them?"

I have already had occasion to observe, that of the peculiar nature of the venereal virus we know almost nothing, and of the *modus operandi* of mercury very little more. Taken into the stomach in its metallic state, it has no action on the body except what arises from its weight or bulk; but in its various states of combination it produces sensible effects. It is a powerful and general stimulant, quickening the circulation, and increasing all the secretions and excretions; capable, however, of being made to operate more powerfully on one or other of these secretions, according to the preparations into which it enters, or the regimen with which it may be combined. Its most characteristic effect is the increased flow of saliva which

it generally excites if given in sufficient quantity. From the writings of Theodoric it appears that mercury was employed in the practice of medicine and surgery as early as the thirteenth century; but its use in venereal cases was first mentioned in a tract by Almenar, published in 1516. It is most probable that the good effects which it produced in cutaneous diseases first led to the employment of it in venereal cases, which being frequently attended with eruptions on the skin, ulcers, &c., seemed to present an analogy to the affections in which mercury had already been found successful. Subsequent to this period it has alternately been held up as the most certain of all specifics, and denounced as the most virulent of all poisons. Many revolutions have taken place in the use of mercury during the last three centuries, owing to the rashness of some and the timidity of others; and it is curious to observe how rival nations have alternately rejected and had recourse to mercury. When decried in England it has been extolled in France; and when it lost its credit in France it was again resorted to in England. The various substitutes which have been at different times proposed for mercury in the cure of syphilis, are for the most part so opposite to it in their nature, that if we believe mercury to be useful or salutary, we must almost necessarily believe the others to be impotent or hurtful. From the latter charge we may indeed exempt one of the present fashionable substitutes, the sarsaparilla, which seems so opposite in its nature to the preparations of mercury, that it would perhaps be more justly recommended as an antimercurial than an antisyphilitic remedy. Of its powers in any way I cannot convey my own opinion in language more energetic than that of the late Dr. Fordyce of London, who recommended to his pupils to prescribe it in the shape of "a pudding or a pie."

Of the many publications which have at different times issued from the press, in order to prove "that there are actually, *in rerum natura*, such remedies and antidotes as will free us from the venereal disease without the aid of mercury," the most singular is that published in 1709 by J. Santilaer, practitioner in physic, dated "from his house in High Holborn, late the dwelling-house of his Grace the Duke of Leeds," and printed, most appropriately, "by George Harris, next door to

the Bagnio in St. James's Street." It is embellished with a plate entitled the "Martyrdom of Mercury," representing men and women with demolished noses, rotten tibiæ, exfoliating skulls, empty alveolæ, fallen palates, &c., all the consequences of that vile poison, mercury. This ancient antimercurialist is greatly shocked by an observation of the celebrated Harvey, who says that mercury is only hurtful to a few, perhaps to one in five thousand; and many passages might be selected from his work to show, that he has anticipated all the modern writers against mercury. But this, while it takes from any originality which may be supposed to belong to the modern doctrines, adds but little to their weight; for while this practitioner is dealing out his anathemas against the medicine, he is perhaps secretly employing it. After all the success which he boasts of from his antivenereal decoction, "the knave admits that one of its component parts he must keep secret, because, forsooth, if divulged, it would tend to his own detriment, and to the no small encouragement of a sin which is only too general and too common already."

Although anxious to rescue from neglect a medicine from which I conscientiously believe that I have seen much benefit, I am not disposed to add to the eulogiums which have so lavishly been bestowed on mercury, nor range myself with those who, shocked at the consequences of its abuse, would engender a prejudice against it, and deprive us not only of a safe and effectual remedy for many syphilitic disorders, but by exaggerating its morbid effects, would discourage its use in other diseases. It surely can be no reason, because the virtues of a remedy have been abused or overrated by some, that we should, by raising a clamour against it, cause it to sink as far below its proper level as it has at times stood above it. Boerhaave's observation, that he knew of no remedy but what became so by its proper and timely use, "Nullum se cognovisse remedium quin solo tempestivo usu tale fieret," is peculiarly applicable to the exhibition of mercury. In the hands of a judicious practitioner, it will fulfil a number of different and apparently contradictory indications; in the hands of ignorance, temerity, or indiscretion, it will certainly do more harm than good.

GONORRHŒA.

The word Gonorrhœa implies a discharge of seminal fluid, and is obviously misapplied in so far as it is generally employed to denote a puriform discharge from the urethra. No practical inconvenience, however, now occurs from the employment of the word in this latter sense; and as it is not my ambition to remodel the language of medicine, but to convey useful information, I would proceed, without dwelling on the early history of the disease, to a question of some practical moment, and which was at one time keenly agitated —namely, the identity of the gonorrhœal and syphilitic poisons.

For many years the sameness of these affections was hardly questioned, and practitioners believed that both were to be cured by the same remedies. The use of mercury, however, which after its first introduction into practice was long held specific in the cure of syphilis, was observed to be given without a proportionate benefit in gonorrhœa; and perhaps it was this which first suggested a doubt of the identity of the two diseases—a doubt which has gradually grown, notwithstanding the ingenious speculations of Mr. Hunter, into a general conviction of the diversity of the two poisons. Those who argue the identity of the two diseases, at the head of whom is the distinguished author just named, account for the different phenomena which they present—the ulceration occurring externally in syphilis, and the discharge of purulent matter without ulceration in gonorrhœa—by adverting to the different texture and functions of the parts affected. Mr. Hunter divides the different surfaces to which contagious matter may be applied into secreting and non-secreting surfaces; the former of which, including the urethra and other mucous membranes, when subjected to irritation or excitement, afford an increased or altered secretion, and the latter, comprising the external teguments, are more prone to ulceration.

The external surface of the glans and the lining membrane of the prepuce, the most usual seats of chancre or venereal ulceration, are not precisely in the situation either of secreting or non-secreting textures; but as these surfaces,

when irritated by the application of the venereal virus, are found to assume the ulcerative inflammation, Mr. Hunter has chosen to consider them akin to the non-secreting surfaces. This is, however, in a great measure a gratuitous assumption; for the natural secretion of sebaceous matter under the prepuce is in many individuals profuse, and in some instances it is so far increased as to constitute a disease termed *gonorrhœa spuria*. But to appeal from this hypothetical reasoning to facts, it must be admitted, that if both gonorrhœa and syphilis are the results of the same poison, we ought occasionally, nay frequently, to see the one affection communicated by a patient labouring under the other. Now this is, on all hands, avowedly so rare an occurrence, that the abettors of the opinion which holds the two diseases to proceed from the same virus, have been forced to the necessity of defending their views by a few cases, questionable in their nature, susceptible of different explanations, and resting upon the testimony of ignorant, interested, or prejudiced witnesses; while, on the other hand, the cases which tend to prove that gonorrhœa is invariably produced from gonorrhœa, and chancre from chancre, are unlimited in number, unequivocal in their nature, and supported by the most unexceptionable testimony both of medical men and of others.

The chief supporters of the identity of the two diseases are Hunter, Swediaur, and Adams; and one of the arguments much dwelt upon in support of their views, is the improbability of syphilis having been conveyed to the inhabitants of Otaheite by seamen who, previously to their landing, had been five months out of port, and who, consequently, could not, it is presumed, have laboured all this time under primary ulcerations, although they might have been subject to gonorrhœa. But the whole history of the appearance of this disease amongst the natives of Otaheite is exceedingly doubtful, as appears from the testimony of Mr. Wilson, who visited this island in 1802, as surgeon of his Majesty's ship Porpoise. And if any argument is to be drawn from historical facts relative to the point at issue, such facts appear to me to support the opinion of a difference in the two poisons; for not only have we accounts of the existence of gonorrhœa prior to those of syphilis, as stated by Dr. Adams, but the ravages of the one

disease have at different periods been described as totally independent of the other.

Mr. Hunter, in support of his views, appeals to experiments, in which he says that venereal chancres were produced by inoculating with the matter of gonorrhœa; but these experiments are completely neutralised by those detailed by Mr. Benjamin Bell, some of which were witnessed by Dr. Duncan, the late venerable Professor of the Theory of Physic in this University, and they are altogether at variance with the experiments of Ricord, already referred to. On experiments, however, on either side of the question, I am less disposed to rely than upon the prevalent opinion of the profession in the present day, and upon a very extensive experience in this department of practice, during which no one case has occurred calculated to impress me with a belief in the identity of the two poisons. The most important authorities in support of the identity of the two diseases have been already enumerated, and amongst those on the opposite side of the question is Dr. Francis Balfour, who in a thesis published here in 1767, was, I believe, the first who publicly defended this doctrine. While mercury was held to be an indispensable remedy in the treatment of venereal complaints, the question regarding the identity of the two poisons possessed an importance, and was agitated with a keenness which are now greatly abated.

Mr. Bell has well observed as an argument in favour of his views, that if a woman labouring under gonorrhœa was capable of communicating indiscriminately either chancre or gonorrhœa, the former ought to be by much the most frequent occurrence of the two, in so far as it is much more easy for the infectious matter to find access to the surface of the glans than to the interior of the urethra. On the contrary, Mr. Bell states that according to his experience, the proportion of cases of gonorrhœa to those of chancre were as three to one, and Mr. Hunter admits that in his practice they occurred as four or five to one. But I must not conceal the very opposite state of things which has in some instances prevailed in the public service. From the Statistical Reports on the Health of the Navy, it appears that the cases of syphilis have on many occasions greatly exceeded those of gonorrhœa.

In the Mediterranean fleet in 1835, the former were to the latter as 595 to 234; and in the same fleet in 1836, the cases of syphilis to gonorrhœa were in the proportion of 710 to 282. My own observations do not enable me to speak with precision on this point; but it must be admitted, that while the surface of the glans and interior of the prepuce are directly exposed to the contact of gonorrhœal matter from the vagina, it is not very easy to see how the infectious matter finds access to the interior of the urethra in any case.

The infection having been received, the disease commences for the most part by a sense of itching or titillation at the orifice of the urethra, the lips of which upon inspection are found more florid than usual, pouting, and somewhat swollen. The discharge is yet scarcely perceptible, but on making water a sense of heat and pricking is experienced towards the point of the penis, and this goes on progressively increasing until the pain in making water becomes exceedingly acute, while the calls at the same time become more frequent. The discharge characteristic of the disease now makes its appearance, at first extremely variable as to quantity and consistence, but ultimately assuming the appearance of pus. From the swelling affecting the lining membrane of the urethra, the stream of urine is often greatly diminished, the glans and sometimes the whole penis are affected with an unusual heat, sense of fulness and swelling. Even in its flaccid state the penis retains a preternatural degree of firmness and tension, particularly along the course of the corpus spongiosum, while it often becomes affected, particularly during the night, with involuntary painful erection and incurvation. This constitutes the symptom termed chordee, one of the most distressing to which venereal patients are subjected.

The swelling not unfrequently extends to the prepuce, and when the opening is naturally small, this swelling, by augmenting the bulk of the glans, and at the same time thickening the substance of the prepuce, and diminishing the extent of its aperture, renders it impossible to denude the glans; thus constituting the affection termed phymosis. When the prepuce is either preternaturally contracted from an original malformation, or from the inflammation incident to it in gonorrhœa, it sometimes happens that in this con-

tracted state it is forced behind the glans, thus giving rise to the disease termed paraphimosis, and constituting an affection extremely troublesome, and not devoid of danger. In this state, while the inflammation and swelling of the glans is increased in consequence of the stricture behind it, the prepuce itself becomes œdematous, thus augmenting the thickness of its coats, proportionally increasing the stricture, and rendering it impossible to draw it forward over the glans. Such are the most common symptoms of a severe attack of gonorrhœa, and these symptoms are greatly varied both in extent and duration by the habits of the individual and his mode of living. In careless dissipated young men they often continue, where their severity is not such as at once to confine the individual, to increase and diminish alternately for weeks, but in no well-regulated regiment should this ever happen. By frequent inspection of their persons, or of their linen, which might be done by the non-commissioned officers, the men will see that it is impossible to conceal their complaints, they will be brought into the habit of reporting themselves immediately on the appearance of disease, and thus the surgeon will be afforded the fairest opportunity of preventing the more severe symptoms and of speedily subduing the milder.

Before proceeding to the mode of treatment it may be necessary to say a few words regarding the pathology of the disease, than which nothing can be more simple. It is now sufficiently established that the formation of purulent matter, which was formerly thought to be a sequence of ulceration alone, takes place with equal facility, and often in very large quantity, from the inflamed surfaces of mucous membranes; of this we have proofs in ophthalmia, in inflammation of the bronchiæ, and very remarkably in the disease now under consideration. Here the discharge is sometimes incredibly profuse considering the limited extent of the inflamed surface, for this in many cases does not reach above one or two inches within the urethra. Mr. Hunter has limited it to one and a half or two inches, which he terms the specific distance, and the purulent discharge, as he has shewn, is furnished solely from the lining membrane, and from the lacunæ. Previously to the time of this distinguished writer the inflammation was thought to extend along the whole course of the urethra and

the prostate, and vesiculæ seminales were thought to be generally affected—an opinion to which the extent of the discharge might appear to give countenance, but which is now ascertained to be erroneous. Many patients will themselves observe, that they have no pain or ardor urinæ beyond a given spot, extending about two inches from the extremity of the penis. Upon desiring them to press along the course of the urethra from this spot forwards, matter will be pressed out, and when this part of the canal is once completely evacuated by drawing the finger two or three times along its course, no more matter can be pressed out from the posterior part of the canal. Although repeated dissections of the urethra in patients dying while affected with gonorrhœa have shown that ulceration of the lining membrane of this passage is by no means a common occurrence, as was formerly supposed, yet there is no doubt that ulcers do sometimes form within the orifice. This I have myself witnessed in the living subject, and we have the testimony of the accurate Morgagni, and of others, that they are occasionally met with in the dead; but such ulcers are generally of a syphilitic character, and I may safely assert that the prevalent opinion of the present day is against the existence of any such ulcers as a principal source of the gonorrhœal discharge.

In the treatment of this disease, particularly in its early and acute stages, we have sometimes to resort to constitutional or general as well as local remedies. General blood-letting is perhaps not so frequently employed in gonorrhœa, as it ought to be. Analogies have often been remarked between ophthalmia and gonorrhœa, and in no case perhaps would this analogy hold good more completely than in the beneficial effects of blood-letting, were we enabled to adopt it at the same early period, and to push it to the same extent in gonorrhœa as has sometimes been successfully done in the treatment of acute ophthalmia; but this, for obvious reasons, does not happen. Gonorrhœa does not prevail to the same formidable extent; the knowledge of its accession is necessarily confined in the first instance to the patient alone; it is not, unless greatly mismanaged, attended with the risk of so much permanent injury to the individual; nor does it naturally excite the same degree of interest and activity on the part of a medical officer

as an epidemic ophthalmia. From these circumstances, the most favourable time for the employment of bleeding in gonorrhœa is often allowed to pass, and it is only when the violence of the attack is such as at once to incapacitate the indidual for his duties, and to compel him to resort to medical advice in the very early stage of the affection, that we have an opportunity of putting in practice this means of relief. In such cases, when the constitution is hale, and the patient young, I am disposed to recommend general bleeding, observing at the same time that in proportion as the attack has been of longer duration, and more frequently repeated, bleeding becomes less necessary and less efficacious.

The use of purgatives to any great extent, in the treatment of gonorrhœa, is by no means an eligible practice. When an opportunity is afforded of employing them in a very early stage of the affection, they will in this, as in most other inflammatory affections, materially promote our views; but from the repeated and long-continued use of purgatives, I may safely assert that no good effect is to be expected, and many instances occur of the disease being prolonged, or terminating in gleet, from patients trying to cure themselves by purgatives. Where much constitutional excitement takes place, marked by quick pulse, and hot skin, accompanied by local irritation, frequent calls to urine, pain and scalding, I know of no constitutional remedy more efficacious than the warm bath at a moderate temperature, from 90 to 100, and continued from 20 minutes to half an hour or longer. This is a remedy from which patients seldom fail to experience the highest gratification, and which is generally followed by an alleviation of the urgent symptoms, both constitutional and local.

Before proceeding to consider the use of local remedies, I may here mention some medicines which are administered internally for the cure of gonorrhœa, and which are thought to have a specific influence on this disease. Of these, the principal are the balsam of copaiba and the cubeb pepper. The former may be given in doses of from half a drachm to two drachms, three times a day, either simply dropped on a piece of loaf sugar, or combined with some common emulsion. In larger quantities, I have generally found it become offensive to the stomach, and loathsome to the patient, before producing

much effect upon the complaint for which it was administered. This medicine is recommended by Velpeau in the form of injection per anum; but this is a practice of which I have no experience.

The Cubeb is the fruit of a pepper vine, "Piper Cubeba," the produce of the Island of Java, and is used by the Javanese in some diseases of children. From that island it is imported into Bengal, and there used in medicine as a stomachic and stimulant; but whether employed by the native practitioners as a remedy for gonorrhœa, I am unable to say. The history of the introduction of this substance into European practice, as given by Dr. Crawford, the historian of the Indian Archipelago, is as follows:—"An officer of the Indian army, sailing up the Ganges, contracted an inveterate gonorrhœa, and had recourse to the usual remedies without effect. One of his servants proposed the cubeb, and it was used with success. This officer communicated the above fact to the surgeon of his regiment serving in Java, where the disease was at the time frequent, and the remedy abundant. Having been given in many instances with success, the practice was gradually disseminated over the island, and subsequently found its way into this country." The pepper well pounded, is exhibited in a little water five or six times a day, in the quantity of a dessert-spoonful, or from two to three drachms, while abstinence from wine and all heating aliment is to be enjoined. Its sensible effects are generally mild; it occasionally causes a slight purging; it imparts to the urine its own peculiar odour, and increases its quantity; now and then it occasions a flushing of the face, and a burning heat in the palms of the hands and soles of the feet.

When this medicine acts successfully, the ardor urinæ ceases, the discharge grows ropy, commonly in forty-eight hours, and sometimes in less; after which the discharge soon stops altogether. In many cases the cure is slower; in a few instances the medicine has been said to produce swelled testicle; and in other cases it has proved altogether ineffectual. Indeed, my own experience in the employment of the cubeb pepper induces me to look upon it as a remedy very uncertain in its operation, but in all cases perfectly safe. I consider it a waste of time to urge the continued use of this remedy beyond a

week, or perhaps ten days at the utmost; for if the discharge does not greatly abate within this period, I consider it in vain to expect any impression to be made upon the disease by the pepper, or perhaps by any other internal remedy. In a comparative trial of different modes of treatment in the cure of gonorrhœa, which was instituted in the 88th regiment, when quartered in the Castle here several years ago, the average number of days during which those treated with the cubeb pepper were confined was five and a quarter, a statement extremely favourable to the use of this remedy. The number, however, was much too limited to entitle me to hold this up as a general average of the issue of cases so treated. Gunpowder is said to be extensively used by the French soldiery as a cure for gonorrhœa. I do not know that this "soldier's cure" is at all used in our service, but any efficacy that it may be supposed to possess probably depends on the refrigerant and diuretic effects of the nitrate of potass.

When the acute inflammatory stage of gonorrhœa has passed over, either by the lapse of time, or under the use of antiphlogistic remedies, our chief dependence for the final suppression of the discharge must rest on the use of local applications in the form of injection. I believe that where the disease has existed for sometime, and where it is accompanied with no constitutional symptoms, it is impossible to make any impression upon it by remedies taken internally, and that, in attempts to cure it in this way, the stomach is sometimes injured, without the urethral affection being benefited in any corresponding degree. In the use of astringent injections, the hands of practitioners were long paralyzed by absurd fears of driving the infection into the blood, as they termed it, and thus producing a confirmed pox. It would appear from a letter written in 1750 to the late Sir Cæsar Hawkins, by Charles Hales, Surgeon to the Savoy Hospital, that the use of astringent injections in gonorrhœa was at that time a practice by no means generally prevalent. This gentleman, who is a strenuous advocate for injections, says that he took the hint of using them thirty-five years before, from a Mr. Green, a surgeon in Lemon Street, Goodman's Fields, who was the only man that then used them, and whose practice raised much clamour, and many objections and prejudices against him.

Since the above period, injections have been recommended by some practitioners, and reprobated by others in terms the most unmeasured. All unbiassed practitioners, however, will, I think, admit that injections, by coming in contact with the seat of the disease, are more likely to act efficaciously upon it than any other form of remedy. If used of an irritating or astringent nature, in the early stage of the disease, where there is already much inflammation, great sensibility of the urethra, and ardor urinæ, the symptoms will in all probability be aggravated; but when the discharge commences, as it sometimes does, without any appearance of morbid sensibility and tenderness in the lining membrane of the urethra, or when such symptoms have subsided, the use of astringent injections is the only practice upon which any reliance can be placed, or from which it appears to me reasonable to expect any benefit.

Although injections have been divided by Mr. Hunter and others into different classes, as emollient, sedative, irritating, and astringent, it is to the last only that my observations apply; for the emollient and sedative injections, applicable to an early stage of the disease, have never appeared to me to be attended with any beneficial effect; and in this state of the complaint, I think more benefit is to be expected from sedative and astringent applications externally to the penis, in the form of fomentations or cold lotions. In this way decoctions of poppy and solutions of the acetate of lead may sometimes be used with good effect. Irritating injections act upon the principle of exciting a new action in the parts calculated to supersede the previous disease; but the susceptibility of the urethra is so varied in different individuals, and in the same individual at different times, that it is difficult to foretell what kind, or what strength of injections will prove generally irritating; and it is equally impossible to foresee the consequences to which an unguarded irritation in the urethra may lead. I consider therefore the use of injections, with a view solely to their irritating qualities, as a practice very far from being generally admissible. Astringent injections, if used too strong, will produce every possible degree of irritation, and may lead to all the ill consequences of those more decidedly of an irritating quality; but when the strength is duly regulated, so as to produce a very slight degree of smarting when injected into

the canal, they are calculated to lessen the discharge gradually, without increasing the inflammation, and to prevent the occurrence of what is termed a gleet, a tedious and troublesome sequela of gonorrhœa in the form of a thin and serous-like discharge. As the application of an astringent fluid to the canal can only be temporary, it requires to be frequently repeated; and perhaps the oftener this is done the better, provided care is taken, by using a round-pointed syringe, and introducing it cautiously, not to irritate the urethra.

The articles used in the form of injections, both from the vegetable and mineral kingdom, are innumerable. Of the former, decoctions of oak or peruvian bark, infusions of tea, port wine, and other substances, have occasionally succeeded in the cure of gonorrhœa. Of the latter, solutions of the metallic salts, particularly those of lead, zinc, mercury, copper, iron, and silver, are most employed; and these nearly in the order in which I have now enumerated them, varying in strength from one to twenty grains to an ounce of distilled water. This variety in the strength of injections marks strongly the different degrees of susceptibility in the urethras of different individuals; and points out the propriety, when we have no previous experience of this circumstance, of beginning in all cases with these metallic solutions in a very diluted state—augmenting the strength of the solution according to the circumstances of the case and the feelings of the patient.

A solution of the most active of all these salts, the nitrate of silver, in the quantity of a scruple and even half a drachm to an ounce of water, was some years ago, in consequence of some reports in favour of it, recommended by the heads of the Army Medical Department, as deserving the consideration of regimental surgeons. How far the general reports upon this practice were favourable, or how many of the army surgeons thought themselves justified in giving trial to it, I am unable to say. I myself had recourse to it in the cases of two soldiers of the 33d regiment, of which I was then surgeon; but although these men recovered quickly, it was at the expense of so much suffering, that I hesitate to recommend it as a general practice. The report formerly alluded to from the 88th regiment, gives the following result of twenty cases treated by injection of a scruple of the nitrate of silver to an ounce of plain boiled water.

These were discharged cured at various periods from ten to forty-two days, the average length of time being seventeen days. The above statement, to say nothing of the sufferings of the individuals, either present or future, is, I think, amply sufficient to deter any judicious practitioner from the repetition of a practice, of the success of which, without at all adverting to its hazard, there is so little reason to boast; for in the very same report there is a statement of the results of fifteen cases treated solely by rest and abstinence. Of these, three were discharged cured in three days, and the rest at intermediate periods, up to the twenty-third day, the average being little more than eight days.

In the early stages of gonorrhœa, much may be effected by subjecting the patient to confinement, strict regimen, and antiphlogistic remedies, with the timely interposition of a proper injection; but when the first two or three weeks are allowed to pass without any effectual treatment, the disease occasionally becomes protracted for months, and this under the most approved modes of practice; our best chance of success is by frequent variations of the kind and strength of injections, as the one first employed soon loses all influence over the discharge. Benefit, in such cases, is also occasionally derived from introducing for a short way into the urethra, a full-sized bougie, or one of a more moderate size, besmeared with some stimulating ointment. In protracted cases, patients, in private life, often run from one surgeon to another, who, happening to prescribe a different remedy from the one formerly in use, is occasionally successful in putting a stop to the discharge, and gets all the credit of the cure, which his predecessor might have retained by a very simple change in his prescription. In fine, I know nothing upon which we can speak with less certainty and precision than on the cure of a neglected or ill-treated gonorrhœa, and I am persuaded that I have lost many patients from being candid enough to tell them so.

The very distressing symptom termed *chordée* is most amenable to opiates, either by the mouth or by the rectum, and cold lotions externally to the penis. A very rough practice is said to exist amongst the French soldiery of treating this symptom, by laying the rigid and incurvated penis on a

table, and forcibly extending it by a smart blow of the fist—a practice leading, in the first instance, to a profuse hæmorrhage, and very likely, I should think, to lay the foundation of a stricture in the urethra. A very common symptom in gonorrhœa, particularly when stimulant or irritating injections have been too early employed, is swelling of the testicle, very absurdly termed *hernia humoralis*. This swelling may originate from any source of irritation in the course of the urethral canal, as well as from blows or other injuries on the testicle itself. When it occurs in gonorrhœa, it seems to be entirely of a sympathetic nature, often appearing suddenly, and sometimes passing quickly from one testicle to the other. It is not unfrequently accompanied with a suppression of the gonorrhœa, which is again renewed as the inflammation of the testicle abates. This has led some authors to advise the introduction of bougies into the urethra, with a view of renewing the discharge—a practice, however, of which, so far as I know, we have no sufficient experience to guide us in forming an opinion. But when a swelling of the testicle occurs while the patient is using injections for the cure of gonorrhœa, these are immediately to be laid aside, and the discharge permitted to take its course until the swelling of the testicle be removed. In the treatment of this inflammation, as in all others, rest and abstinence are of essential benefit; the local application of leeches, anodyne fomentations and sedative lotions, with a horizontal posture, and suspension of the testicle by a proper bandage, are often speedily followed by an abatement of the inflammation, and a rapid diminution of the swelling. But it not unfrequently happens that a considerable degree of induration, sometimes in the whole body of the testicle, but more especially in the epididymis, remains after the bulk of the swelling is removed. Frictions with camphorated mercurial liniment, and repeated blisters, are the means which I have found most efficacious in the removal of these chronic indurations. In short, the treatment of swelled testicle is to be conducted on the same principles which regulate our conduct in the treatment of other glandular swellings; and it is therefore unnecessary to enter into a more particular enumeration of the measures required.

STRICTURES.

Before entering upon the consideration of the nature and treatment of strictures, it may be well to advert to the dimensions and structure of the urethra. This canal, which commences at the bladder, passes out from the pelvis under the symphysis pubis, and entering the corpus spongiosum of the penis, is continued forwards through the centre of that body, until it terminates at the extremity of the glans. In this course the following remarkable dilatations are observed: One immediately at its commencement, where it is encompassed with the prostate gland; one immediately anterior to its exit from under the pubes, which is termed its bulb, and for the most part also a dilatation less capacious and more indefinite towards the glans. With regard to the structure of this canal, much diversity of opinion has existed amongst the most experienced and dexterous anatomists. Mr. Hunter considered it to possess a muscular structure, and his brother-in-law, Sir Everard Home, has strenuously supported the same doctrine by numerous arguments and observations. In addition to many analogical arguments in favour of the muscularity of the urethra, the abettors of this opinion adduce also certain practical observations in favour of their views, tending to show that muscular properties reside either in the membrane of the urethra itself, or in the substance immediately surrounding it.

In opposition to the doctrine of the muscularity of the urethra, many ingenious observations are adduced by Sir Charles Bell, who contends that it is from confounding the effect of the proper muscles of the urethra that the canal itself has been imagined to possess a muscular property. "We can be at no loss," says he, "to account for spasm in the posterior part of the urethra, since five inches of the canal in that situation are surrounded by muscles, the accelerator urinæ, the sphincter vesicæ, the compressor prostatæ, and the levator ani, while it should never be forgotten, that it is the sensibility of the urethra which governs their contraction;" and he concludes that the part of the canal anterior to these muscles has no muscular power. Mr. Shaw has also supported this view of the subject by some ingenious observations, in a paper

inserted in the tenth volume of the Transactions of the Medico-Chirurgical Society of London. He observes, that if the urethra be laid open, we see that its inner membrane is continuous with the mucous coat of the bladder, that it is a secreting coat, and has a great many ducts opening upon its surface. "If the pudic artery be injected with size and vermilion, the membrane will be seen to be highly vascular. If a portion of the urethra be distended, and the spongy body be carefully removed, the inner membrane will appear delicate and transparent, without the slightest trace of muscular fibres on it. When the urethra is first opened, there is an appearance of muscular fibres running in the length of the canal; but by examining this with attention, we shall find that it is principally owing to the inner membrane having been thrown into folds by the elasticity of the spongy body. We are referred to comparative anatomy for the ocular demonstration of muscular fibres, and it is confidently asserted that circular muscular fibres are seen in the urethra of the horse—an appearance which seems to be nothing but the internal membrane of the urethra thrown into folds by its own elasticity, and by that of the spongy body. The ejaculator seminis is continued up to the glans in the horse, and when we see this strong muscle surrounding the whole of the urethra, we must be at a loss to suggest a use for muscular fibres in the delicate mucous membrane." The expulsion of an injection in a case of gonorrhœa has been considered as one of the most decided proofs; but if we throw an injection into the dead penis, the fluid will be thrown out with some force; and Mr. Shaw relates the following experiment in confirmation of this fact:—He threw a small quantity of water into the corpus spongiosum, so as to swell the penis a little, making it resemble the state in which we generally see it in gonorrhœa, and on injecting the urethra, the fluid was thrown out "nearly two yards." "Surely," he adds, "no one will say that there was muscular action existing in the urethra of a body almost putrid."

What has been considered the spasmodic action of strictures, at times resisting the passage of a bougie, which on other occasions passes easily, and the circumstance of a bougie being occasionally grasped in a stricture, so as to require some force in withdrawing it, have been considered undeniable

proofs of muscularity in the membrane of the urethra; but these phenomena may be otherwise explained by the turgescence or congestion of the part, and none of them give a satisfactory proof of muscular contraction. In short, I know of no anatomical observations which decidedly prove the existence of such muscularity, nor have I met, in the course of a good deal of experience, with any phenomenon in the living body calculated to impress me with a belief in the existence of spasmodic or muscular action in the fore part of the urethra, anterior to the insertion of the acceleratores urinæ. As much of the doctrine relative to the formation and to the treatment of strictures has been built upon the supposition of a muscular power in the urethra, I have thought it necessary to offer the foregoing remarks on this point, previously to a consideration of the site, the nature, and the cure of stricture. The doctrine of spasm has engrossed too much attention in the consideration of this disease, and I cannot help suspecting that it has occasionally been found a convenient means of explaining a failure in the introduction of the bougie, and this even where such force has been used as would have overcome any muscular power which the urethra can be supposed to exert; which would indeed have lacerated any part of that membranous canal, had it not been strengthened by the deposition of adventitious matter from disease.

On examining accurately the dimensions of the urethra, we observe that one of the narrowest parts of the canal is immediately behind the bulb, and that it is also less capacious towards the root of the penis, from three inches and a half to four inches and a half from the external orifice, where the penis becomes pendulous, and these are points at which strictures very frequently take place. Mr. Shaw, in a second paper on the subject of strictures, in the twelfth volume of the Medico-Chirurgical Transactions, asserts, that in more than a hundred dissections which he has made of diseases of the urethra, he has never seen a stricture or narrowing of the canal posterior to the ligament of the bulb; nor has he been able to find one example of stricture beyond this part, among those preserved in the College Museum. In almost all cases where a narrow stricture has existed for some time

at the ligament of the bulb, or in any part of the urethra anterior to this, the membranous and prostatic portions are dilated beyond their natural size; and when such a stricture as causes occasional retention of urine has existed for some years, the bladder is found to be not only thickened, but sometimes sacculated.

Strictures are generally attributed to the effects of gonorrhœa, or to the use of astringent injections in its cure; and it cannot be denied that injections used in the inflammatory stage of gonorrhœa are calculated to produce this disease, as are also all irritations in the canal, from whatever source, as excess of venery, abuse of stimulants, stone in the bladder, &c. How variously these irritations will operate upon different individuals, according to the natural susceptibility of the urethra, may be in some measure learned from what was said when speaking of the strength of injections for gonorrhœa, and also from certain phenomena occurring in the treatment of strictures. On the introduction of a bougie, many people experience very little pain or uneasiness. In others, this operation is attended with great pain, irritation, and contraction of the canal, with fainting, shivering, even convulsions, and other distressing symptoms.

Three varieties of stricture have been enumerated by systematic writers: the spasmodic, which is represented as of occasional occurrence, and capable of dilatation to the natural size of the urethra; the permanent or organic, which admits not of rapid dilatation; and the mixed, which partakes of the nature of both. Of the existence of the first, of a pure spasmodic stricture, I am somewhat sceptical, unless we are to consider as such the obstinate contraction of the muscular fibres surrounding the orifice of the bladder; at least I can assert, that I have never observed a pure spasmodic action of the urethra anterior to that part of it which is covered by the acceleratores urinæ, and have never seen a spasmodic action so complete as to stop the progress of a catheter or bougie until it reached the neck of the bladder. The formation of a permanent stricture is explained by Söemmering, Delpech, Richerand, and other eminent foreign surgeons, as occasioned by a thickening of the diseased part; and these writers do not appear to entertain any belief in the spasmodic nature of

such cases. Sir C. Bell very justly observes that the white condensed substance which forms the most common kind of stricture is incapable of yielding to spasmodic action, and that, even if the diseased part of the urethra were originally muscular and contractile, the condensation and callosity of the part must be attended with loss of such contractile power.

The condensation of the structure of the urethra, or deposition of adventitious matter within its substance, which alone, I consider, as constituting stricture, does not always take place round the whole circumference of the canal equally, but is often confined to one side of it, throwing the passage to the opposite side. The disease occasionally occupies but a small portion of the canal, in some instances extending no farther than if the part had been surrounded with a packthread. In other cases, and these by no means uncommon, the urethra is contracted for perhaps an inch or more of its extent, its coats being often irregularly thickened, and forming a tortuous canal. Sometimes, also, we meet with two distinct strictures within an inch of each other, and the whole intermediate space somewhat contracted. When the contraction is not considerable, it appears, on examination after death, to be merely a narrowing of the urethra; but a permanent stricture in a more advanced state, usually forms a distinct projection into the canal, and the diseased portion of the tube acquires an almost cartilaginous hardness. With regard to the alleged mixed kind of stricture, partly spasmodic and partly organic, I shall merely observe, that while I do not deny the possibility of a stricture in the posterior part of the urethra being acted upon by the powerful muscles surrounding it, I must profess my belief that when an organic stricture is situated in the fore part of the tube, and when a portion of the canal in this situation has become indurated and callous, it is little capable of being influenced by the spasmodic contraction of muscular fibres so feeble as to render their very existence doubtful, and that consequently all obstructions in this part of the passage, from spasm, are hypothetical.

To enumerate all the peculiar sensations and symptoms, both local and constitutional, to which strictures occasionally give rise, would lead me into an endless detail. I shall therefore content myself with noticing the more prominent. It is

seldom that a patient suspects the existence of stricture till he observes his urine made in a very minute stream, and incapable of being forced from him without a very unusual effort. The diminution of the stream comes on so slowly and gradually, that he forgets what it is to make water freely. When the disease is somewhat advanced, the urine is voided in a spiral, irregular, scattered or forked stream, and sometimes only in drops. It occasionally happens that the disease is altogether overlooked, until the patient, after some debauch or excess, is surprised by a complete retention. Frequent and unseasonable calls to make water, especially during the night; nocturnal emissions; and a gleety or puriform discharge from the urethra, occasionally suppressed, and liable to recur upon the slightest excess or irregularity, are all frequent attendants upon stricture. We find patients complaining sometimes of strange and indescribable feelings about the genital organs, as of animals creeping or fluttering in the urethra, with intolerable itching. And, in addition to these and various other symptoms referable to the seat of the disease, strictures are often attended with derangement of the general health, and severe constitutional symptoms, of which one of the most common, particularly in warm climates, is a complete paroxysm of fever, commencing with shivering, and succeeded by a regular hot and sweating stage. During the rigor, nausea and vomiting frequently occur; and the patient, having repeated calls to make water, often finds it pass more easily during the paroxysm than at other times.

But, whatever reason we may have, from the abovementioned symptoms, to suspect the existence of stricture, we are only rendered certain of its presence by the introduction of a probe or bougie; and, while such an examination points out the site of the obstruction, it may be so conducted as to gain some information as to its nature and extent. For this purpose, a species of probe, consisting of a small round ball of silver, attached to a flexible wire of the same metal, has been recommended by Sir C. Bell. A soft bougie, with a thick coating of plaster or wax, of such a size as to enter the stricture, and to receive an impression, by remaining some time in contact with it, is also occasionally employed for this purpose. By means of Sir C. Bell's instrument, or even by

the use of a common probe, when the stricture was so situated as to be within its reach, I have occasionally been able to obtain useful information; but I must say, that in my attempts to obtain a satisfactory impression of strictures by the soft bougie, I have frequently been disappointed. By either of these instruments, however, the site of the obstruction may always be ascertained, and we are then in some measure prepared to proceed to the treatment.

For this purpose, bougies of various descriptions—some of them calculated to act by conveying escharotics to the stricture; some of them calculated to act either by medicinal substances contained in their composition, or with which their surfaces are imbued; and others calculated to act simply by distending the stricture, and promoting its absorption—have at various times been in use. The destruction of a stricture by escharotics was formerly accomplished by conveying caustic to it through a canula, an operation proposed by Wiseman, who observes, that "when the obstruction is a caruncle, and you cannot pass it, you may well conclude it is callous; in which case you may pass a canula into the urethra to that caruncle, and whilst you hold it there steady, you may convey a grain of caustic into the canula, and press the caustic to it." In this manner was the lunar caustic employed to a considerable extent by Mr. Hunter. The difficulties, however, of this practice, particularly in the treatment of strictures beyond the straight part of the urethra, induced Sir Everard Home to propose and to employ what is termed the armed bougie. This consists of a common plaster bougie with a small piece of lunar caustic, the nitrate of silver, fixed in its point. Of the efficacy and comparative advantages of this instrument, Sir Everard speaks with much enthusiasm; and I still think it adapted to the treatment of the ring-like stricture described by Mr. Hunter, as if formed by a pack-thread tied round the urethra. It has also been recommended for some very irritable strictures, the irritability of which is destroyed with the diseased part of the canal; but even Mr. Hunter himself, the great authority for this practice, seems to have been disposed to limit its utility to strictures which occupy a very small extent of the urethra. "I have seen," says he, "one or two cases where the contraction was of some length and irregular, which would have

puzzled me if I had attempted the cure with caustic, because I should have been apt to suspect that I was making a new passage by my gaining ground, and yet not relieving the patient by the removal of the symptoms." That this practice is ill adapted to extensive forms of stricture may be learned from a case detailed by Sir E. Home, in which the caustic was applied 486 times before a catheter could be passed into the bladder.

As a practice better adapted to extensive strictures, where the lunar caustic has been found to act less successfully, the kali purum, or potassa fusa, was urgently recommended by Mr. Whately, to whose treatise on Strictures of the Urethra I must refer for a particular account of his mode of using it, and content myself with observing that the principle upon which he proceeds is to carry down a small portion of this caustic on the point of a common bougie of such a size as to pass through the stricture, and having rested the bougie for a few moments at the entrance of the stricture, until the caustic may have time to liquefy, he then carries it onward and passes it two or three times backwards and forwards, through the contracted portion of the canal, so as to cover its whole surface with the liquid caustic. By this procedure he asserts that the kali is equally diffused over every part of the strictured surface, and only abrades the membrane of the stricture without producing a slough—an explanation which is not very satisfactory.

Of Medicated Bougies, containing various active ingredients in their composition, the most celebrated were those of the French surgeon Daran, the mode of manufacturing which was kept a profound secret; but, as these have long been banished from practice, I consider it unnecessary to enlarge on their nature or effects. A practice, however, somewhat analogous in its operation to these medicated bougies has been submitted to the profession by Mr. Bingham, who recommends the application of the Unguentum hydrargyri fortius to the surface of the stricture, by introducing into it a bougie besmeared with this ointment, which he conceives to act by stimulating the absorbents of the part—a well known effect of the ointment in other instances. Having no personal experience of this practice, I am unable to say anything in its favour, but consider myself justified in noticing it by the

general character of Mr. Bingham's work, which contains a useful summary of all the more common methods of treating stricture; and also by the character of another work of the same author, on diseases of the bladder, which obtained the Jacksonian prize awarded by the Royal College of Surgeons of London for the year 1821.

The treatment of strictures with the common bougie, neither armed nor medicated, which is the only practice now in general use, may be so conducted as to accomplish a cure by a slow dilatation of the contracted part, or by promoting absorption. With a view to this effect, a bougie such as the stricture will admit is to be introduced and retained for a short time increasing its size very gradually, so as not to occasion any considerable pain to the patient; or the bougie may be increased more rapidly, and retained in the urethra as long as the patient's feelings can tolerate it. A common practice, at one time prevalent in France, was to introduce a silver or elastic gum catheter through the stricture, and not to withdraw it for some days, when a larger one was substituted in its stead. By this means the cure of stricture is sometimes accomplished more speedily than by the occasional use of the bougie as more generally employed in this country; but in proportion as a cure is effected more rapidly, so is it less permanent. The length of time during which patients are able to retain a bougie with tolerable ease varies greatly in different individuals; and although in irritable constitutions this may not at first extend to more than a few minutes, yet by extending the period gradually the patient becomes able to retain it sometimes for hours without inconvenience; and it is obvious that the longer it is retained the more speedily shall we accomplish our purpose, for by the continued compression the activity of the nourishing vessels will be destroyed, and the part will ulcerate or be absorbed.

Of the bougies in common use, which are made of plaster, catgut, elastic gum, steel, or silver, the last two are by far the most manageable instruments; and although the others may occasionally be found useful, the steel, plated, or silver instrument, particularly when the stricture admits a bougie of some size, is undoubtedly the safest, from the surgeon having always a command over the point of the instrument.

Many ingenious contrivances have been brought forward with a view to the dilatation of strictures, but most of them, it may be observed, are inadmissible into very tight strictures; and whenever a stricture is of such dimensions as to admit Wiess' dilator, or any similar instrument, the cure is comparatively easy by a succession of common steel bougies.

The position of the patient for the introduction of a bougie, whether erect or horizontal, is in common cases a matter of indifference; but wherever difficulty is anticipated, the patient should be made to lie down upon a bed or couch, by which means he is enabled to put his thighs in a state of complete abduction, and the surgeon has free access with his fingers to the perinæum, and to the rectum if necessary, for guiding the bougie. This instrument ought always to be warmed and besmeared with oil or lard previously to its introduction, and where a solid metal bougie or catheter is to be carried beyond the arch of the pubes, I consider the following remarks of Mr. Bingham well deserving attention; they convey the sentiments which I have long entertained upon this point, and I know not where to find these sentiments better expressed:—"Until the point of the curved instrument reaches below the arch of the pubes, it may be introduced either with its concavity or its convexity towards the patient's abdomen—the former is the most simple, and therefore the preferable mode, except it be rendered impracticable by the protuberance of the patient's abdomen. The manner of passing the instrument with its convexity towards the patient's body is objectionable, because when its point has got past the arch of the pubes, it must be turned half round to reverse the position of the other end, and in effecting this turn, if the point be not made the centre of motion, there will be great danger of injuring the urethra. In taking this semicircular sweep, the instrument must be allowed to be loose in the surgeon's hand, and he must delicately accommodate his hand to its movements as it inclines to approach to or recede from the body, whilst he gently carries it round, and then the urethra surrounding it will determine the centre of motion to the point. But if the surgeon exerts the slightest degree of control beyond what has been mentioned, the point of the instrument will never constitute the centre of motion, and he will incur risk

of doing mischief great in proportion to his unnecessary interference."

It now only remains for us to advert to those troublesome and dangerous cases of stricture accompanied with a complete retention of urine, and where no instrument can be passed into the bladder. In such cases three modes of proceeding have been adopted. Some of the French surgeons from the days of Paré downwards, and particularly encouraged by the example of Desault, have been in the habit of forcing a passage into the bladder, by means of a conical silver catheter, "sonde conique d'argent;" but such a practice is very far from being generally advisable, for the strictured part of the urethra is for the most part much firmer and stronger than the rest of the canal, and it will readily be understood how much more easily an instrument of this description will lacerate the sound than dilate the diseased portion of the tube. Puncturing the bladder is in such cases another expedient occasionally resorted to, and as I have seen and practised this operation with success, I am glad to find it spoken of with more favour than it was some years ago. But this measure only affords a temporary relief, and in no degree tends to better the condition of the strictured part, except in so far as, by abating the irritation, it allows the spasmodic and inflammatory action in the parts to subside; after which we are sometimes again enabled to carry a bougie or catheter into the bladder through the urethra. The third, and what I conceive the best practice in such cases, is to open the urethra from the perinæum, behind the stricture, and by continuing our incision forwards through the strictured portion of the canal, we may be immediately enabled to carry a catheter from the point of the penis into the bladder, and proceed to heal the wound in the perinæum over it. By this practice we give immediate relief to the urgent symptoms from the retention of urine, and by the removal of the stricture we obviate their recurrence. There are some excellent observations on this subject in Mr. Shaw's papers in the Medico-Chirurgical Transactions, where he inculcates the propriety of patients submitting to this practice, even in cases where a complete retention has not taken place, with a view to obviate other serious consequences of stricture. This practice I have now employed in three cases of stricture from injury

of the perinæum, and in two of them with complete success. The first of those operations was performed five-and-forty years ago, in the case of a soldier of the Royals, who became affected with stricture from an injury in the perinæum by falling under a gun during an action on shipboard. In that instance, I was induced, by the man's urgent entreaties for relief, to lay open the urethra from the perinæum; and the result was so completely successful, that I found my patient a few weeks afterwards preparing to act the part of a jockey at a horse race—a proceeding upon which I put my veto. My colleague Mr. Syme has of late advocated, and has frequently and successfully performed the operation of dividing strictures from the perinæum on a small-sized grooved staff, which he has never hitherto failed in introducing through the stricture. This practice has been the occasion of some controversy; but whatever may be the estimate of its value, eventually adopted, I consider the profession indebted to Mr. Syme for having familiarised us with an operation which, in my opinion, ought to have been more frequently performed; while I consider some of the objections made to it to be exaggerated, or altogether unfounded.

A proposal was many years ago submitted to the profession by Mr. M'Ghie, a naval surgeon, for the division of strictures by means of a cutting instrument introduced into the urethra; and a similar practice, which was originally suggested by Mr. Howship, has been employed and recommended by Mr. Stafford, for the division of stricture by means of a lancet-pointed stilette or bougie, introduced through a catheter open at its extremity. Of these plans I have no personal experience. They cannot be looked upon as devoid of danger; and although they may occasionally be executed with success by a man who devotes a large share of time to their study and practice, yet, like too many other ingenious proposals in surgery, they will never be rendered generally available in the hands of surgeons who have neither the command of time nor the choice of subjects.

There are other affections of the genito-urinary organs of much importance to the military surgeon, although from the limits to which I restrict myself in this publication, I am not enabled to enlarge upon them. One of these is the fungoid

excrescence of the testicle, successfully treated by covering it in with a portion of the contiguous scrotum. A permanently relaxed state of the scrotum, tending to a pendulous condition of the testes, with chronic swelling, has been remedied by the removal of an elliptical portion of the redundant scrotum—a practice which has also been resorted to in the treatment of varicocele. This last-mentioned affection, by no means unfrequent amongst soldiers, has of late been advantageously treated by the vein-truss, as recommended by Mr. Curling, and previously employed by Mr. Colles of Dublin, over the saphenic opening, in cases of varix of the lower extremity.

DISEASES OF THE RECTUM AND ANUS.

The diseases of these parts are to be met with frequently, and often in aggravated shapes, amongst military and naval men; and I am induced to notice them here at the suggestion of the late Director-General, whose experience I find coincides with my own as to their frequency amongst the officers of the army. For this I must confess that I do not see any very obvious cause connected with their profession, and am therefore inclined to look upon the aggravated forms in which they are occasionally seen, as rather the result of oversight and neglect in their early stages, than of any professional or constitutional predisposition. It is in the shape either of piles or of fistulæ that diseases of this region are chiefly to be met with. Of the former, in the loose and popular acceptation of the term, several varieties exist, and these swellings have long been divided, both by the profession and by the public, into external and internal piles. The circulation in the hæmorrhoidal veins is liable to become more or less obstructed in consequence of constipation of the bowels, or engorgement of any kind within the abdominal cavity. This leads, in some instances, to a varicose state of these vessels, in which they are often found highly irritable, and requiring anodyne, sedative, and astringent applications, which, with the occasional use of leeches in the neighbourhood, and attention to keep

the bowels open, are the principal means of relief. But we have sometimes distinct, numerous, circumscribed, and permanent tumours existing at, or immediately exterior to, the line of junction between the skin and mucous membrane of the rectum.

These tumours are often little attended to in their earlier stages, or if relief is sought, it is chiefly by means of anodyne or astringent applications; but by frequent accessions of irritative and inflammatory engorgement, the tumours progressively increase in size and number, until they ultimately produce extreme and urgent distress. Their removal then becomes the only effectual resource, and the sooner this is undertaken the better. The apprehension of hæmorrhage has sometimes led to hesitation in this operation, and led to the proposal of removing them by the ligature. I believe, however, that in this, the external form of the complaint, excision, either by the scissors or knife, is by far the most expedient operation. I was once nearly accessory to the death of a fine healthy young soldier of the Inniskillen Dragoons, in consequence of the application of a ligature in a case of this kind. It was attended with such violent symptoms of abdominal inflammation and constitutional disturbance, as led me to entertain very serious apprehensions for the man's life. By one of those remarkable coincidences which one occasionally meets with in the course of a long professional life, I was called upon, at the distance of fourteen years afterwards, to operate upon the surgeon of the same regiment, who was suffering from one of the most aggravated and extensive forms of piles which I have ever seen, and here the opposite difficulty occurred, a profuse hæmorrhage from the operation of excision; but the danger and distress from this cause did not appear to me to be at all comparable to the former.

In some individuals, the mucous membrane lining the rectum is liable to undergo morbid changes, from causes not always very obvious. Among those mentioned by Mr. Syme, in his work on this subject, as leading to the development of internal piles, are, "residence in warm climates, a luxurious diet, deficient exercise, and excitement of the generative organs, especially when several of these operate together;"

and here, it will be observed, are some causes not unfrequent amongst military officers. One of the most prominent and distressing symptoms of internal piles is frequent and repeated bleeding, to such an extent sometimes as to give the patient a blanched, bloodless, and waxy look, to impair his general health, and to render him highly nervous and irritable. This bleeding proceeds sometimes from a small papilla, scarcely coming under the denomination of a pile or hæmorrhoid, but surrounding the orifice of an open artery whence the blood issues, as I have seen it, in small jets, and which may be completely checked by pinching up a small portion of the mucous membrane, and surrounding it with a ligature. In other and more common cases, the internal, like the external piles, appear in the shape of one or more distinct tumours, with portions of the membrane as it were abraded, or the whole surface presenting an irregular granulated appearance. The true state of the disease in this form, it is obvious, can only be ascertained by a careful examination of the protruded tumours—a protrusion which is liable to occur after every evacuation, and which in old and aggravated cases becomes in some measure permanent.

In the treatment of this form of the disease, although temporary relief may be found from medicines, of an astringent or anodyne character, either taken internally, or applied locally in the shape of unguents, lotions or injections, yet there is no security for the patient's health or comfort without an operation. Here, however, the ligature, as a general practice, is, in my opinion, equally entitled to the preference as excision in the former. The risk of hæmorrhage is greater from the knife, and the risk of irritation is less from the ligature than might be supposed. It seldom happens that the tumour is of such a form as to admit the convenient or efficient application of a single ligature around its base; but even if it were so, I am inclined to think that the practice of transfixing the tumour with a needle and double ligature, so as to include the two halves, each in a separate noose, is the best. This appears to me to diminish the irritation, by the facility which it gives to the ligatures to ulcerate their way through the base of the tumour, in consequence of the continuity of the investing membrane being broken by the needle, and the ligatures

applied, in part at least, to a raw surface, yielding readily to the ulcerative process.

The only other complaint which it seems necessary to advert to here is the formation of fistula, and this, it may be observed, is, like the former, often the result of causes sufficiently obscure. I have, however, in many instances, amongst hale and vigorous young soldiers, seen such fistulæ originate from acute and violent, perhaps neglected, inflammatory attacks in the neighbourhood of the rectum. Whenever symptoms indicative of any such inflammatory attack occur, the case ought not to be hastily overlooked, but should be very accurately examined, and if tension, hardness, tenderness, or swelling be observed at any particular point in the neighbourhood of the anus, the patient should be immediately ordered to bed, his bowels opened with some mild purgative, and leeches applied freely to the pained part. By these measures the inflammation will sometimes be speedily checked, and much future suffering prevented; but they should not be too long persevered in. In the treatment of cases of this kind, the peculiar structure of the parts, the quantity of fatty or cellular substance surrounding the extremity of the rectum, and the dense structure of the integument externally, should be kept in view. This structure of parts sometimes leads to the formation of deep-seated abscesses ending in fistulæ, without the appearance of much inflammation externally, and these evils are, I apprehend, sometimes aggravated by too long perseverance in sedative or repellent applications, and too great a reluctance to make a timely incision. Young surgeons, sometimes more sensitive to their own character than to their patient's welfare, are loath to show any symptom of disappointment; they lead the patient and bystanders to expect that a flow of purulent matter must necessarily follow the incision, and look for nothing but censure and discredit when it does not. Now, in my opinion, they would act in a way much more conducive to their own reputation, and to their patient's well-being, if in cases like this, where the existence of matter is often doubtful, they were at once to state to the patient that they were not certain of finding matter, but that the incision would be highly beneficial in concentrating the inflammation round the wound, giving issue to a quantity of blood, and affording a facility

for the escape of matter should it ultimately form. These observations are all directed towards the treatment of those acute and painful swellings in the neighbourhood of the anus, which sometimes end rapidly in the formation of fistulæ, but in a large proportion of cases the disease forms in a much slower and more insiduous manner, scarcely attracting the patient's attention until matter is already formed, perhaps discharged, and that either by an opening externally, or into the gut, or both, forming the varieties of fistulæ which are distinguished as external, internal, and complete. When the disease has assumed any of these shapes, it is in vain to expect permanent or satisfactory relief without an operation, and this consists in the division of the septum, or parts interposed between the fistulous opening and the cavity of the rectum. Into all the details of this operation it is not within the scope of my present plan to enter, but I may remark, that in a very large proportion of cases of this disease, I have seen a second or a third operation necessary—this no doubt often from an unhealthy state of the contiguous parts leading to the formation of successive sinuses; but in some cases also from want of accurate examination in the first instance, and in cases of complete fistulæ, from want of due attention to discover the site of the internal opening, which is alleged to be always immediately within the sphincter.

PUNISHMENTS.

There are perhaps few situations of greater professional responsibility than that in which a military surgeon was heretofore placed, when called upon to regulate the extent to which corporal punishment might be inflicted on a soldier, without endangering, on the one hand, the health of the individual, or on the other, the interests of the public service. When it first became incumbent upon me in the fulfilment of my duty, to discuss this matter publicly in my lectures, and to notice it in these outlines, I found the literature of the subject

extremely defective. Several extraordinary cases were indeed noticed by Dr. Hamilton and others, in which it was sometimes difficult to say whether the rigour of the commanding officer, the skill and tact claimed by the surgeon, or the cunning, and occasionally the fortitude, displayed by the patient, was the more conspicuous; but I found little to guide me in attempting to suggest a few hints for the consideration of the young surgeon, in the ordinary discharge of this important and unpleasant duty. I was obliged to trust almost exclusively to my own personal observation and experience, which had indeed been but too ample, having served for many years during the war, under two of the most unrelenting administrators of the law then in the service.

Since that period the investigation of this subject has been undertaken, and I may say exhausted, by Mr. Marshall, in a succession of papers in the United Service Magazine, giving a "Historical Sketch of Military Punishments in so far as regards non-commissioned officers and private soldiers." This inquiry, embracing a period from the earliest authentic records to the present day, has brought to light a series of interesting facts on the constitution and management of the army, recorded in the works of historical and military writers, as well as in those of professional men. And Mr. Marshall, who in his former work on the recruiting of the army, and the feigned disabilities of soldiers has done so much to expose the frauds practised on the public, has in these sketches, thrown out many valuable observations for the consideration of the authorities, tending to ameliorate the condition of the soldier, by leading to increased discrimination in the infliction of punishment, and in apportioning it more accurately to the nature and extent of the offence.

The punishments at present authorised in the British army consist chiefly of privations and forfeitures of different kinds, as of what is termed "beer money," of the additional pay to which a soldier becomes entitled by length of service, and of the time to be reckoned in estimating his claim to a pension. Those more immediately affecting the health of the soldier, and more particularly claiming the attention of the surgeon, are extra drill, shot exercise, imprisonment with or without hard labour, solitary confinement, and corporal punishment or flogg-

ing. Upon such punishments as merely imply the degradation or disgrace of a soldier, it is not within my province to enlarge, and the following observations must be confined to those in which his health is involved. Many modes of punishment formerly in use in the British service are now happily abolished, and only known as matters of historical curiosity. One of these, the only corporal punishment to which officers were subjected, was boring the tongue with a hot iron for blasphemy, and this, according to Captain Grose, remained in force till the time of Queen Anne.

The Wooden horse was one of the punishments formerly in use amongst the soldiery. This consisted in a piece of framework somewhat in the shape of those used for supporting scaffolds, furnished with a rude imitation of a horse's head and tail and mounted upon wheels, one of which is figured in Kay's Edinburgh portraits. Upon this the culprit was placed, as if on horseback, and dragged round the garrison, his hands being tied behind his back and muskets hung to his legs. This mode of punishment has been long laid aside, "having been found to injure the men materially, and sometimes to rupture them." The last time I find any notice of the wooden horse having been used, is in Knox's account of the American campaigns under General Wolfe and Lord Amherst, when it was inflicted on a grenadier accused of cowardice; and in that instance the culprit was mounted in a petticoat, and a broom placed in his hand; as the historian observes, "to the inexpressible mirth of the whole garrison, and of the women in particular."

Picketing was a mode of punishment formerly much used in the cavalry, and which I have myself been called upon to witness. It was commonly inflicted by placing a culprit upright against a post in the stable, one foot resting upon a blunt round-pointed peg fixed in the ground, and one arm secured by the wrist to a hook in the post; the bare heel of the sufferer was made to rest on the stump, which, though it did not break the skin, put him to great torture; and the only means of mitigation was by resting his weight on his wrist, the pain of which soon became intolerable. Soldiers were sentenced to stand on the picket for ten minutes, a quarter of an hour, or longer, according to the nature of their offence. This

like riding the wooden horse, has been for some time left off. It is stated to have lamed and ruptured many soldiers; and in our own day we have a remarkable case of luxation of the shoulder-joint, mentioned by Sir Astley Cooper, which was produced by the punishment of picketing, inflicted by an arbitrary individual on board of an Indiaman.

Walking and Stand-up Drill are punishments heretofore extensively used in the service. The former consists in making a soldier, equipped in heavy marching order, move about for hours together upon the parade; the latter consists in making him stand in an upright position for a length of time with his face to a wall. This latter punishment is now, I believe, forbidden, and the former, if employed with due discretion, is but little calculated to injure the health of the soldier. Carried to excess, these punishments are said to have laid the foundation of permanent derangements of the circulation, and of organic disease of the heart, as will appear from the following quotation from Mr. Marshall's work on the enlisting, discharging, and pensioning of soldiers. "A temporary derangement of the functions of the heart, and consequent palpitation, is not unfrequent amongst soldiers, more particularly young recruits, before they are dismissed from drill. For some time previously to a general inspection, the men are often kept long under arms, and to this circumstance may sometimes be attributed slight derangement of the circulation, fainting of weakly individuals, &c. Standing under arms is, I believe, now altogether forbidden as a punishment, which is a wise and humane measure. Frequent tedious drills and inspections are supposed to be sometimes the forerunners or causes of rupture, aneurism of the heart, varicose veins of the leg, &c., and perhaps not without foundation."

Shot exercise, now frequently used as a punishment, consists in making the soldiers move piles of large cannon-balls from one spot to another, and keeping them employed in this for a length of time. To avoid an undue strain on the loins and abdominal muscles in this exercise, which might be productive of hernia, the soldier is directed to bring his body close to the shot, and to raise it perpendicularly upwards instead of leaning forwards and raising it at a disadvantage. These judicious precautions, suggested by Mr. Tufnell, have

been considered by the Commander-in-Chief of so much importance as to have been pressed upon the attention of governors of military prisons and commanding officers of regiments in the shape of a circular memorandum issued from the Horse Guards.

Solitary confinement, when used with discretion, is but little calculated to affect the health of the soldier, and, at the same time, proves extremely irksome to him. I have heard an Irish soldier, when on trial before a court-martial, solicit the president, as a favour, to give him an hundred lashes and to save him from solitary confinement, a request in which, it may be supposed, he was not likely to be indulged. The circumstances most likely to affect the health of men under solitary confinement, are the extreme cold of northern latitudes, and a damp or ill-ventilated state of the cells—points which it is to be hoped are now duly adverted to in most of our military prisons. It is, however, only for limited periods, and with due attention to diet and exercise, by the tread-mill or otherwise, that this punishment can be considered eligible or safe. A letter on the subject of solitary confinement, as affecting the health of soldiers in warm climates, was addressed some years ago to Sir H. Hardinge by the late Dr. Malcolmson of the Madras army. When the statements therein contained as to its injurious effects on the bodily health are taken in conjunction with Sir Robert Peel's unanswered statements in the House of Commons, as to its lamentable effects on the minds of prisoners, they are well calculated to make those philanthropists pause, who have indiscriminately advocated this mode of punishment without a due knowledge of the subject in all its bearings.

From an abstract statement showing the mortality in a few of the Indian jails during the years 1833 and 1834, it appears that at Deenajpoor in Bengal the annual deaths were upwards of fifty-seven per cent of the average numerical strength. Dr. Malcolmson has done well to call public attention to this subject; more particularly as the strong feeling against corporal punishment, rapidly gaining ground, may lead to the substitution of punishments incomparably more cruel and destructive to the future health and well-being of individuals. "I have reason to believe," says Dr. Malcolmson, "that more

real misery has arisen in twelve months from imprisonment in the great jails of India than has been inflicted by corporal punishment in a hundred years." Much of this misery is no doubt owing to the insufficient diet with which solitary confinement has been too often combined. There are some excellent observations on this subject in one of Mr. Marshall's papers, and I perfectly concur with him in opinion when he observes, "that an adequate quantity of food, sufficiently varied, must be allowed to prisoners, if it be intended that they should afterwards be useful to their country or to themselves."

It should always be borne in mind, that men who subject themselves to this and other species of punishment, are often dissipated characters, liable to *delirium tremens*, or to a minor degree of this, which the soldiers themselves call the *horrors*. With this disease I have frequently known men seized when under solitary confinement, and as complaints of this kind should never be allowed to gain head without the surgeon's attention, the non-commissioned officers, or others whose duty it may be to communicate with prisoners, should be enjoined to make early reports of any appearance of indisposition. Delirium tremens, on which we possess some valuable observations by two distinguished army physicians, Doctors Sutton and Blake, is generally treated successfully by the administration of large opiates. As this disease offers no peculiarity connected with military life, I have not thought it necessary to enlarge upon it; but I cannot avoid this opportunity of expressing my apprehension, that the treatment by opiates is used too indiscriminately, and may sometimes be pushed to an injurious extent. In the cases of young subjects, when the attack was attended with much flushing of the face and an obvious tendency to phrenitis, I have repeatedly employed blood-letting, particularly local bleeding, with advantage. In several cases where the disease has ended fatally, I have seen effusion into the ventricles of the brain; and indeed this was observed conspicuously in the case of a soldier who died in the cavalry barracks here a few years ago. The practical question seems to be, whether, in young subjects and in the early stage of the disease, this effusion can be obviated, checked, or limited by evacuating blood.

Corporal punishment, or Flogging, has recently been the subject of a laborious investigation by authority of the House of Commons, and it is much to be regretted that the opportunity was not embraced to inquire more fully into its physical as well as its moral effects. In the whole of this protracted investigation we have the evidence of only one medical officer, Mr. Parker of the Royal Marines, a surgeon of two-and-forty years' service, and this with reference to a case in which a man of the most dissipated and disorderly habits died from locked-jaw after the infliction of a hundred and thirty-four lashes. Had this inquiry been farther pursued, it would have appeared that, in cases where death has occurred, it has very generally been from punishments of limited extent, and from adventitious causes, or peculiar idiosyncrasies which neither military nor medical officers could foresee. Such inquiry would have tended to relieve them from public odium, from the imputation of that inhumanity with which they have been so freely and unscrupulously charged; and to have set the public mind right upon a subject in which it has very often and very recently been much misled. With regard to commanding-officers generally, I am not a believer in this savage and inhuman disposition, and am of opinion that their errors, in former days, proceeded from mistaken views of what was necessary to support the discipline of the service. Of this I cannot, perhaps, give a better proof than by stating the fact, that a commanding-officer, notorious for flogging, has often spoken to me privately, preparatory to the infliction of a punishment, saying that he would not take down the prisoner from a fear of his motives being misinterpreted by the men, but that he would be very glad if I should find a reason for taking him down as soon as possible.

The extent of punishments is now greatly circumscribed. The sentence of a court-martial is, I believe, restricted to fifty lashes—a circumstance which relieves the surgeon from much irksome duty and heavy responsibility. In this climate, soldiers are generally able to bear the limited number of lashes to which the sentence of courts-martial have of late years been progressively restricted, but on foreign stations, men's constitutions are sometimes brought into a state in which even fifty lashes might prove most seriously hurtful. The formidable

ulcers formerly noticed as prevalent upon some of the East India stations are liable to supervene upon punishments, and I have now before me some remarkable cases of this kind which occurred amongst soldiers serving on the western coast of Africa.

In all climates, it should be recollected, that those individuals who are most likely to render themselves amenable to corporal punishment, are very frequently the least able to bear it; and this applies equally to those whose vital powers may be temporarily impaired by an occasional debauch, and to those whose constitutions may be more seriously and permanently injured by a long-continued course of dissipation in early life, and by the remorse and broken spirit under which they are often brought to punishment. This applies particularly to those wretched individuals, the profligate irreclaimable sons of gentlemen, who, after having spent their patrimony, offended their friends, and estranged themselves from society, enlist in the army. Of the unfavourable state of such subjects for corporal punishments, I shall never forget a remarkable instance which occurred to myself at the very commencement of my service as an army surgeon. The patient, in that case, had dissipated his patrimony, subsequently enlisted, and then deserted. He was overtaken before he had got many miles from the barracks, was brought back a prisoner, instantly tried by a garrison court-martial, and was punished with more than usual solemnity, by the tap of the drum. Although this individual did not receive what at that time was considered a severe punishment, yet he was received into hospital in a state of great mental and bodily depression; his appetite failed, and he became much emaciated; although, fortunately for the credit of the surgeon, his back cicatrized, he was seized with dysenteric symptoms, and in a few weeks died.

Corporal punishments are usually inflicted with a "Cat o' nine tails," which consists of a short handle like a drum-stick, with the above number of lashes attached to it. Those in use in the army are made of the common whip-cord. The lashes are given in succession by the drummers of the regiment, each inflicting twenty-five strokes of the cat at a time. The severity of this punishment depends greatly upon the age and strength of the drum-boys, and upon their practice in this part

of their duty. Upon the number of lashes which a man may receive without endangering his life, it is extremely difficult to speak with precision. Five hundred lashes, with the common army cats, was always considered a very full punishment; and although in former times I have seen many men receive more than this number, yet such punishments are generally to be considered as hazardous. Although a medical officer has not the power of preventing the adoption of any species of punishment which a commanding officer may choose to inflict *on his own responsibility*, yet it may be well to caution the young surgeon against sanctioning by his approbation any of those arbitrary, unusual, or apparently severe modes of punishment occasionally resorted to, such as described in the following extract of a charge upon which a field-officer commanding a regiment in Ireland was tried in 1829, and censured in general orders:—1st, "The instrument of punishment, namely the cat o' nine tails, with which such corporal punishment was inflicted, had been previously steeped in brine or pickle." 2d, "The said cat o' nine tails was again frequently steeped or washed on the private parade, during the infliction of such corporal punishment, in a tub of salt and water." 3d, "The intervals between the infliction of the lashes were, during part of the foresaid punishment, protracted to an unusually long period."

With the minor punishments authorised and used in the navy I am but little acquainted. Some of them would appear to be sufficiently harmless, and at the same time equally ludicrous. The following is a mode of punishment sometimes practised in the navy with the view of checking drunkenness, and which I have heard described by a gallant and distinguished admiral, as adopted by him in his younger days when commanding a frigate. A large wooden collar was made, painted red, white, and blue; this was put about the neck of the person who was found drunk, and he was obliged to wear it until he found another in the same condition. Being always anxious to divest himself of this ornament, he naturally became very sharp-sighted to the failings of his neighbours. In this branch of the service, the instruments used for inflicting corporal punishment are different from those employed in the army. The cats are longer and made of much heavier cord.

The lashes are here apportioned by dozens, and being inflicted by the boatswain's mates, who are generally active powerful men, this species of punishment becomes much more severe in the navy than in the army—a dozen of lashes in the former being equal to at least fifty in the latter. There are two modifications of corporal punishment employed in the navy, which naturally add much to its severity. In what is termed *Flogging round the fleet*, the culprit is conveyed in a boat, with certain ceremonies, from ship to ship, receiving in succession a proportion of lashes from the boatswain's mate of each, while the respective crews are paraded to witness the infliction. In the punishment of the *Gauntelope*, usually termed Gantlet, the whole ship's crew is disposed in two rows standing face to face, at open order on both sides of the deck, each man being furnished with a hard twisted cord, having several knots on it. The culprit, stripped to the waist, passes between these rows, each man being enjoined to apply the knottle to his shoulders as he moves along in slow time, preceded by the master-at-arms, who places a naked cutlass under his arm, pointing backwards; by which means the delinquent is prevented from quickening his pace, and evading the punishment awarded him. These last-mentioned punishments are only inflicted for very heinous crimes; they are of a most severe and protracted nature. Men occasionally fall down insensible under them; and they demand the most anxious attention from the medical officer whose distressing duty it may be to superintend them.

The common method of dressing the backs of punished men in this country, is with a solution of acetate of lead applied by means of a cloth or piece of lint soaked in it; and under this application the swelling and ecchymosis consequent upon the injury for the most part subside rapidly, and the part speedily heals. Even when the punishment has been severe, and the parts in consequence ulcerate considerably, lotions of this kind are found eligible; but when the ulceration becomes extensive, and puts on a sloughing or gangrenous form, it falls of course to be treated by the various applications formerly recommended for ulcerations of that character. All over India, and in the West Indies also, the backs of punished men are dressed most successfully by the young leaf of the

plantain, "Musa Paradisiaca" of Linnæus. This is a practice in all probability adopted from the natives of these countries, and is akin to the water dressings, and other natural productions employed in the dressing of wounds in savage life which we would often do well to imitate.

The foregoing observations will be sufficient to impress young men with a due sense of the responsibility devolving on a military or naval surgeon, when called upon to superintend the infliction of corporal punishments. It is, I conceive, less necessary to dwell upon motives of humanity and discretion, than to caution military surgeons against attempts which are sometimes made to deceive them, by soldiers feigning complaints to evade punishment, and feigning syncope or fits during its infliction. I would caution the young surgeon also against any idle or pertinacious display of his own consequence in a case where he may fancy his authority paramount to that of the commanding officer. While it becomes him upon all occasions to support his professional opinions with firmness and determination, he must not lose sight of the soldier's maxim, that "there can't be two commanding officers." And while it may be necessary to call to mind what the discipline of the army and navy demands, every thing due to humanity may, I hope and believe, be very safely trusted to the natural feelings of a British surgeon.

DISEASES OF TROOPS ON FOREIGN STATIONS.

THE proportion of our troops constantly employed on foreign stations imperiously calls upon those professional men who are destined to attend them, to qualify themselves for their difficult and dangerous duties, by embracing every opportunity of making themselves acquainted with the nature and treatment of those diseases to which so many brave men fall victims in tropical climates. It is, however, more particularly to the causes of disease on foreign stations, and to the means of its prevention, that the views of professional men may be most advantageously directed. The medical officers of the army and navy ought to recollect that it is to them, and them only, that the world has to look for correct information on the diseases incident to many of our foreign possessions, and they have not, perhaps, always seen distinctly that it is by prevention rather than by cure that the efficiency of our fleets and armies is to be maintained. While in other countries the whole profession may be said to be occupied in one train of inquiry, the army and navy surgeons of Great Britain have special fields of experience, observation, and research open to no other body of professional inquirers.

Connected with the present subject is the selection of men for intertropical service, as regards their period of life, their previous occupations and mode of living, and their physical constitution—points to some of which I have cursorily adverted in my Essay on the diseases of the European troops in India. Bearing upon this subject, is the more or less frequent relief of corps on foreign stations, embracing the general question of

limited or unlimited service; and the important subject of the acclimatization of troops—a question upon which, until of late years, no doubt was started, and no difference of opinion existed. A more liberal provision for those who have wasted their health in intertropical climates, or spent their working days in the service of the state, would be best advocated by those who, in a professional capacity, have witnessed their sufferings. The subject of punishments, also, which last engaged our attention, is one of increased importance as regards the health of the soldier, moral and physical, and the efficiency of the service in tropical climates.

As the mortality among troops employed abroad is so much greater than that among troops on home service, a corresponding degree of care ought to be taken to preserve their health. And among the various means which may be employed to prevent disease among troops on foreign stations, none is of more importance, or, in general, more under the control of authority, than the selection of that period of the year for their disembarkation which is most congenial to the constitutions of natives of the United Kingdom. This implies the necessity of an accurate knowledge of the seasons of extreme heat and cold, and of the periodical returns of rain or of hurricanes in tropical climates. It were also desirable to possess much more extended information than we yet have on the topography of the principal military stations, on the site and construction of the barracks and hospitals, and the natural products of the several countries, in as far as they are applicable to the subsistence of the troops, or the dieting of the sick. It would give me great pleasure were I able to refer to a comprehensive work of this kind, or to a series of works for the different presidencies in India, and the different commands in the West Indies. With regard to the latter much valuable information may be obtained from the Statistical Reports already so often referred to; but the writings of medical officers, while many of them abound in minute details of the symptoms and treatment of disease, are deficient in that more important information bearing on its prevention.

Although far from being disposed to advocate or to countenance some of those visionary schemes which have been proposed with a view to lower the tone of the European con-

stitution on approaching a tropical climate. I think a judicious surgeon will do well, in his communications with the commanding officer, and his intercourse with the men, to enforce, whether by regulations or remonstrance, the propriety of the soldier being more abstemious in his living, more sparing in the use of animal food, and cautious in the use of fruits, which are so tempting to the new comer. To be careful of exposure to the excessive heat of the sun, or to the noxious night air, particularly when located in the neighbourhood of jungles, marshes, or other malarious situations, and, above all, to abstain from that heedless indulgence in the excessive use of spirituous liquors, so commonly the error, and so frequently the ruin of the British soldier in tropical climates. This devotion to spirituous liquors, "does but enervate their frames, deprives them of reason, and leads to the commission of crimes the most disgraceful and abhorrent." In the emphatic words of a general order, issued by Sir Charles Colville, when commander-in-chief at Bombay, "it makes them forget every consideration for themselves or their neighbours, disgraces the religion and country they belong to, and bids defiance to the laws of the king and government they serve, whom they are sworn to obey, and whose bread they eat."

Before proceeding with the consideration of tropical diseases, it may be well to give a view of the extent and general distribution of our forces. Being at present engaged in an extensive war with the gigantic power of Russia, our military establishments are to be considered in an exceptional state; but they will probably not be again reduced, at least for many years, to the too limited establishment which existed at the time of the publication of the last edition of this work. The British army, independently of the ordnance department, then consisted of about 110,000 men, distributed nearly as follows:— Upwards of 28,000 were stationed in Great Britain, 14,000 were employed in Ireland, 24,000 in India, and 42,000 in other foreign stations. To these fall to be added the several colonial corps, consisting of Negroes, Hottentots, Malays, and Cingalese, in the pay of the British Government, with the vast army belonging to the Honourable East India Company. This comprises a force of European artillery and infantry at the several presidencies of about 10,000 men, and 176 regi-

ments of native cavalry and infantry, exclusive of local and irregular corps. This will give some idea of what the medical establishment of such an army is, or ought to be; and will shew to many, who have taken but a limited view of this subject, what a field lies open for professional research in the various forms of disease to which such a numerous and varied body must be subject, in the study of the various climates and localities which they occupy, and in the different descriptions of duty in which they are employed. To obtain a correct view of the relative ratio of mortality among soldiers in different climates, it is essentially necessary to ascertain in the first instance the ratio of mortality which occurs among troops in their natural climate, namely, Great Britain and Ireland. The prevailing diseases among the troops employed in the United Kingdom do not differ essentially from the diseases which affect the non-military classes of the population. From very extensive materials it has been found that the annual proportion of sick among troops in this country, usually ranges between 3 and 5 per cent, and that the annual mortality during peace is about 15 per 1000, or 1 death in 66 of the strength.

The foreign stations occupied by our troops may be classed as follows:—India, Ceylon, China, New South Wales, Mauritius, Cape of Good Hope, Windward and Leeward Islands, Jamaica and Honduras, British Settlements in North America, Gibraltar, Malta, and the Ionian Islands. The territorial possessions of the East India Company extend from the 8th to the 33d degree of north latitude, and from the 72d to the 93d degree of east longitude. They are divided, exclusive of the recently acquired territory of Scinde and the Punjaub, into four presidencies, the Bengal and North-West Presidencies, and those of Madras and Bombay. The ratio of sick among European troops is from 8 to 12 per cent; and the prevailing diseases are dysentery, fever, and liver complaints. From 40 to 50 per cent of the whole mortality is caused by bowel complaints, and the annual ratio of mortality among European troops serving in India, including Ceylon, probably varies from 50 to 70 per 1000.

India. *Bengal and North-West Presidencies.*—These I am induced to consider in the same section, as it is only of late

that the latter has been erected into a separate presidency. Calcutta, or Fort-William, and Agra, are respectively the capitals or seats of government. Fort-William is situated in 22° 23′ north latitude, and 88° 28′ east longitude; Agra in latitude 27° 12′ north, and in 78° 17′ east longitude. At Calcutta, the cool season of the year commences in November, and continues till nearly the middle of March, during which period the mercury in the thermometer ranges from about 55° to 70°, and the mean temperature of the whole year is 78° 3′. That of the Sanatarium at Darjaling is 54°, and at Cherrapunjee about 64°. At Agra, the mean temperature of the year is about 76°, and that of the Sanatarium at Simla, one of the finest climates in the world, about 62°. November is decidedly the best period of the year for troops to arrive at Calcutta. In addition to the Company's artillery and European infantry, three regiments of British cavalry and eleven of infantry serve in these presidencies—the native troops, consisting of ten regiments of light cavalry, and seventy-four of infantry, besides numerous bodies of irregular horse and foot. The mean annual ratio of mortality among European troops in Bengal is about 57 per 1000. There are many important papers in the "Transactions of the Medical and Physical Society of Calcutta" connected with the health of the troops in this presidency; and of the more recent publications bearing specially on its diseases, I would particularly mention "Twining's Diseases of Bengal," and "Martin's Medical Topography of Calcutta."

Madras, or Fort St. George, is the seat of government of the Madras Presidency. It is situated in 13° 4′ north latitude, and 80° 29′ east longitude, and the mean temperature of the Coromandel coast is 85° 1′, and that of the Sanatarium at the Neilgherries in this Presidency 56° 5′. The north-east monsoon commences about the middle of October, and with it the cool season of the year on this coast. From the 15th October till the 15th December the flag-staff is struck at Madras, and no ships are permitted to enter the roads. The best time of the year for troops to land at Madras is during the period between the 15th December and the end of February. One regiment of British cavalry and six of infantry serve in this Presidency. The native force consists of eight

regiments of light cavalry and fifty-two of infantry. The annual mortality among European troops at Madras is about 53 per 1000. Of professional works treating more especially of the diseases of the troops in this Presidency, are "Annesley's Sketches of the most Prevalent Diseases of India," his larger work on the "Diseases of India and of Warm Climates generally," and Geddes' "Clinical Illustrations of the Diseases of India." These works contain much of that kind of information already pointed at; many valuable Tables and Returns illustrative of the diseases prevalent in the several divisions of the Madras army, and at the principal military stations under that Presidency.

Bombay, the capital of another Presidency, is situated on the island of Salsette, latitude 18° 58′ north, longitude 72° 38′ east. The climate of Bombay is temperate, and the atmosphere cooler than in many parts of India, in consequence chiefly of its insular situation. The mean temperature is 85° 4′, and that of the Sanatarium at the Mahabuleshwar hills is 66° 2′. Heavy rains prevail at Bombay, and along the Malabar coast, with little interruption, from the end of May to the beginning of October, and consequently the landing of troops is best effected in the months immediately subsequent to this. One regiment of British cavalry and six of infantry serve in this Presidency — the native army consisting of three regiments of light cavalry and twenty-nine of infantry, besides irregular and local corps. The annual mortality among European troops is about 40 per 1000. I am not aware that any extended work, having special reference to the diseases of this Presidency, has been published, but there are many valuable papers bearing on the health of the troops in the "Transactions of the Medical and Physical Society of Bombay."

Ceylon.—This island lies between the 5th and 9th degree of north latitude, and the 79th and 82d degree of east longitude. It is computed to be about 900 miles in circumference. Its greatest length is 280, and its greatest breadth 150 miles. Ceylon is a flat island, except about one-eighth of its extent, which rises near the centre and forms an irregular plateau of from 1800 to 2200 feet above the level of the sea. The mean

temperature of the air on the flats along the coast is about 81° or 82°. In the upper country it is about 73°. The north-east monsoon sets in on the east coast of Ceylon about the beginning of November, accompanied by comparatively cool weather. The best period for troops to land at Trincomalee is during the months of January and February, whereas the most suitable season for troops to disembark at Colombo, the west side of the island, is during the months of June and July. On the interior plateau there is not much difference of season, and consequently one period of the year is nearly as suitable as another, in as far as health is concerned, for the march of troops into the interior. There are two regiments of the line and a native regiment of rifles employed on this island. The prevailing diseases, not only among Europeans, but also among the natives, are dysentery and fever. The usual ratio of sickness among European corps is seldom under 8 per cent, and the ratio of mortality from 1817 to 1837—a period of 20 years, including the two years of the insurrection—was found to be, on an average, 75 per 1000 annually. Dr. Davy has given a short chapter on the diseases of Ceylon in his general work on the Kandyan country; and Mr. Marshall published in 1821 a small volume on the "Medical Topography of the Kandyan country," and the diseases prevalent amongst the troops during his service in the island.

China.—I am in possession of some valuable manuscript Reports and Returns of the sickness and casualties amongst the Queen's troops employed in the late expedition, for which I am indebted to Dr. French, the senior surgeon of the forces. The troops seem chiefly to have suffered from fever and bowel complaints, and a great proportion of the deaths has occurred from dysentery, but we are not yet in possession of any extended statistical reports upon the health of the troops, nor am I able to state the best period of the year for disembarkation. There are at present, I believe, three regiments of European infantry serving in China.

New South Wales.—The colony of New South Wales is situated on the eastern coast of New Holland, between the 9th and 39th degree of south latitude, and the 108th and 153d

degree of east longitude. The climate is generally salubrious, although the heats in summer are sometimes excessive. The hottest and most unhealthy months are November, December, January, and February. The mean temperature during these months is 80°, and that of the year 62° 9′. March and April may be looked upon as the rainy season, and of course the most unfavourable for the disembarkation of troops. The mean annual mortality among the troops is about 15 per 1000.

Mauritius or Isle of France.—This island is situated in latitude 20° 15′ south, and longitude 58° 29′ east, 100 miles north-west from the Isle of Bourbon. It is 18 leagues in circumference. Its greatest length is 14 leagues, and its greatest breadth 10. The heat from November to April is very great. In elevated or inland districts the mean temperature in winter is 67° while in summer it is 76°. Reliefs ought to arrive between the months of April and October. Two regiments and a reserve battalion are serving in the island. The mean annual mortality among the troops is 30.5 per 1000.

Cape of Good Hope.—This colony occupies 125,000 square miles of the southern apex of the continent of Africa. It lies between the 29th and 34th degree of south latitude, and the 17th and 28th degree of east longitude. The thermometer varies from 56° in July to about 86° in January. The months of May, June, and July are frequently very wet. In January, February, and March, the temperature is commonly very high, the mercury in the thermometer sometimes rising to 107° in the shade, but the mean temperature of the year is 67° 3′. September, October, and November are delightful months, and this is the best period of the year for the landing of troops. Previous to the commencement of the Caffre war there were one regiment of heavy dragoons, two regiments, one wing, and one reserve battalion of infantry, and a corps of mounted riflemen employed in the settlement. The mean annual mortality among the troops is about 15 per 1000.

Windward and Leeward Island Command.—This

comprehends that portion of the American continent termed British Guiana, with the islands of Trinidad, Tobago, Grenada, St. Vincents, St. Lucie, Dominica, Antigua, with Montserrat and St. Kitts, Nevis and Tortola. The geographical position of the lesser Antilles, of which the above islands form an important part, is between 10° and 23° 3′ north latitude, and between 59° 30′ and 85° west longitude. The best time for troops to arrive at these islands is during the months of November, December, and January. There are six regiments, a reserve battalion, and two colonial corps stationed in this command. From that part of the statistical report "On the sickness, mortality, and invaliding among the troops," which is already printed, we have obtained minute and valuable information with regard to the climate, seasons, sites of barracks, hospitals, dieting, and other circumstances affecting the health of soldiers serving in the different garrisons in the West Indies; and from this it appears, that the mean annual ratio of mortality among troops serving in the Windward and Leeward Island Command has been found, on an average of 20 years, to be 93½ per 1000, or one death in eleven of the strength.

Jamaica.—This island lies between the 17th and 18th degree of north latitude, and the 76th and 78th degree of west longitude. Its length is about 140 miles, and breadth between 40 and 50. The medium heat at Kingston throughout the year is 80°. The best time suited for the arrival of troops in Jamaica is during the period between the beginning of January and the end of March. The air is cooler and drier at this season than at any other period. The rain which falls during the latter month of the year is commonly dried up by the month of January, and consequently the exhalation from a moist soil is much less than in December. There are generally five regiments of the line, and sometimes a corps of Africans employed on this station, which includes also Honduras and the Bahama Islands. The prevailing disease is fever. The mean annual rate of mortality among troops in Jamaica, for a period of 20 years, has been found to be 143 per 1000, or about one death in seven of the strength.

British Settlements in North America, including

Canada, Nova Scotia, and the Bermudas.—The latter consists of a group of islands extending in a continuous chain about twenty-five or thirty miles in length, but in breadth not exceeding three and a half miles. They lie in latitude 32° 25′ north, and in longitude 64° 50′ west, and are said to exceed 300 in number. The climate and seasons in this extensive command are in many respects similar to those of Britain, and the landing of troops may be regulated accordingly. There are eleven regiments, three reserve battalions, and some local corps employed in British America. The fatal diseases in the Bermudas are fever, affections of the lungs, and bowel complaints, and the annual mortality among the troops is 32.5 per 1000. In Canada, 20 per 1000; and in Nova Scotia, 18 per 1000. There is a special work on the "Medical Topography of Upper Canada," by Mr. Douglas, formerly of the 8th regiment of foot.

Gibraltar.—Gibraltar is situate in latitude 36° 9′ north, and longitude 5° 17′ west; its mean temperature in the hottest months is 84°, and in the coldest 51°. From the middle of November to the end of March is the most proper time for landing troops in Gibraltar, the soldiers then arriving at a time when the climate differs little from that of Great Britain. Seven regiments are usually employed in this important garrison. The mean annual mortality among the troops is about 22 per 1000.

Malta.—This island is about 50 miles from the coast of Sicily in latitude 35° 36′ north, and longitude 15° 16′ east. It is about 20 miles in length, 12 at its greatest breadth, and 60 in circuit. The temperate months are from October to May, and the unhealthy are July, August, and September, when the heat is generally excessive, being frequently 95° to 98° in the shade. The arrival of troops ought to take place during the period from October to January. The garrison consists of two British regiments, and a reserve battalion, two companies of artillery, and one Maltese fencible corps. the prevailing diseases of the island are, dysentery, fever, and liver complaints. The mean annual mortality among the troops is about 18.7 per 1000.

Ionian Islands.—These comprehend Corfu, Paxo, Santa Maura, Cephalonia, Ithaca, Zante, and Cerigo. The healthy months are from October to May, when fever generally commences, and continues until the end of September. Troops should therefore arrive about the months of November and December. The usual number of troops employed in this command is about six regiments. The prevailing diseases in these islands are endemic fever and dysentery. The mean annual mortality among the troops is about 28.3 per 1000. In Dr. Hennen's valuable work on the "Medical Topography of the Mediterranean" much important information will be found regarding the health of the troops at the three last mentioned stations.

From the preceding statements it will be observed, that fever, dysentery, and liver complaints are the prevalent diseases in those foreign stations where our troops are destined to serve, and indeed these are the principal diseases in tropical climates generally. In 1838 I had an opportunity of perusing and recommended for publication, one of the prize theses submitted to the Medical Faculty of this University by Dr. Allan, "On the diseases of Madagascar and the Seychelle Islands," from which it appears that there also the prevalent diseases, of which we have hitherto had scarcely any written account, are nearly similar. I shall therefore, instead of attempting a detailed account of the diseases of each station or garrison, which would lead to a useless repetition, proceed to offer a few observations, in succession, on the diseases above enumerated, as being, from their frequency and intensity, objects of the greatest interest to the military and naval surgeon. I have been induced, from the importance attached to the subject by the Madras Government, to make a few remarks on Beriberi, Rheumatism, and Burning of the Feet, my knowledge of which is derived from the observation of others; and I have added a few observations on the Guinea worm as a source of suffering and inefficiency amongst the troops at certain stations, particularly under the Presidency of Bombay.

In concluding this section, I would advert to a very handsome present which has lately been made to me by Mr. Alex-

ander Keith Johnston, author of the Atlas of Physical Geography, and Geographer to her Majesty for Scotland. Mr. Johnston was induced, in consequence, I believe, of a suggestion of mine, to construct a map of the geographical distribution of diseases, illustrative of a valuable statistical paper on that subject, read before the Association for the Promotion of Science, at their meeting at Edinburgh in 1850. This map, which now adorns my class-room, is constructed upon a very large scale, chiefly, as regards our colonial empire, from information furnished by the statistical reports on the health of the army and navy. The proposal of constructing a map of this kind was lately submitted to the Epidemiological Society by my friend Dr. M'William of the Royal Navy, without being aware of Mr. Johnston's labours. From a recent conversation with Mr. Johnston, I find that he is still employed in perfecting this map; and I hope ere long to see it published in a portable form, so as to render it available to surgeons going upon foreign service.

TROPICAL FEVER.

The great extent of the British colonies, and the peculiarities in their climate, will explain the variety of fever which the army and navy surgeon has occasion to treat. He will find the remittent forms prevalent in one locality, the intermittent in another; and this, again, assuming the several types into which it has been subdivided, as quotidion, tertian, &c. This disease frequently appears in a highly concentrated form, and the great mortality amongst the troops in our numerous West India settlements and garrisons proceeds chiefly from what is termed Yellow Fever—a disease distinguished above all others for the frequency and extent of its visitations, its rapid career, and fatal tendency. But notwithstanding the aggravated forms in which this disease has appeared, and the universal attention it has attracted amongst all classes of practitioners in the West Indies, one of the most important points in its history still remains a subject of dispute; I allude to its contagious or non-contagious nature.

The only way, perhaps, of explaining this incongruity of

opinion is by admitting that the yellow fever, like some others, may become contagious under peculiar circumstances. Numerous facts seem to attest that the effluvia issuing from the bodies of a number of human beings confined too closely, whether in a state of health or disease, will occasionally produce a contagion, which is capable not only of exciting fever among those so confined, but of propagating itself afterwards from them to others. Independently of numerous observations in the writings of Lind, of Pringle, and of others, which countenance this opinion, a recent and very memorable instance of the apparent generation of such a contagion has been alluded to by Dr. Johnson, in his work on tropical climates. "The transports which received and conveyed home the wretched remnant of Sir John Moore's army after the battle of Corunna, afforded decisive and melancholy proofs that bodies of men confined close together between the decks of a ship in stormy weather, will soon become sickly, and that their diseases may be communicated to nurses and others, after they are landed, washed, and placed in clean and airy hospitals. It is not probable that these men could have carried any infection on board, either in their persons or clothes, after a rapid retreat, during which almost every stitch of garment was washed from their backs by the incessant rains. A dreadful and sanguinary battle at the water's edge gave them no time to contract infection, or even to clothe themselves at Corunna. They precipitated themselves tumultuously, naked, exhausted, and wounded, into the first vessels that came in their way, and were thus crowded, from choice or necessity, during a cold, wet, and tempestuous passage, across the Bay of Biscay. They embarked, indeed, with an unusual predisposition to disease, arising from excessive fatigue, chagrin, exposure to the elements by day and night, nakedness, want, occasional inebriety, insubordination, and last of all, exhaustion from the severe conflict which closed their disastrous retreat. On the passage a most fatal typhoid fever broke out, which spread far and wide amongst the nurses and medical attendants of the hospitals in England, when they were landed, although it was highly improbable, not to say impossible, that a particle of fomites or the matter of contagion could exist among them at the moment of their embarkation. And it was too fatally

proved that every transport exhibited a most destructive focus of infectious fever before they reached England, while the tempestuous weather for some days after the ships came into port, prevented their disembarkation, and confined these men to its continued operation."

The question of contagious fever has lately been the subject of a very interesting and important investigation by authority of Parliament, in consequence of a fatal outbreak of fever in Her Majesty's ship Eclair, and its supposed importation by that vessel into Boa Vista, one of the Cape de Verd Islands. The results of this inquiry were laid before the House of Commons in January 1846, and were subsequently re-considered by the late Board of Health in their "Second Report on Quarantine." The opinion of this Board, as well as the opinions of many able and experienced observers, Sir William Burnet, Dr. Gillkrest, and others, are opposed to the doctrine of contagion, whether as a general attribute of yellow fever, or in the particular case of the "Eclair." Dr. M'William of the Navy, again, who was officially employed to investigate this subject on the spot, contends strenuously for the contagious nature of this fever, and its importation by the Eclair. In some of his communications, printed in the "Parliamentary Paper," and in his "Farther Observations on the Yellow Fever of Boa Vista," &c., Dr. M'William has argued this matter with consummate ability, has established his point to the satisfaction of many of the most scientific physicians of the day; and, without going so far as to say that my belief in the non-contagious character of yellow fever generally has been shaken, I am disposed to admit that Dr. M'William has made out an exceptional case in the fever of the "Eclair and Boa Vista."

Although my own observations on the endemic fever of Batavia, which I consider in every respect analogous to the yellow fever of the West Indies, have convinced me that contagion forms no essential part of its character, I must not withhold the distinguished names of those medical philosophers who contend for its contagious nature, amongst whom are to be ranked Lind, Blane, Pym, Chisholm, Fellowes, Gilpin, and many others. In opposition to these, stand the names of Hunter, Jackson, Mosley, Bancroft, Burnett, and Fergusson, all of whom have been employed in the public service of the

country, all of them appealing to their personal experience, and all of them, on either side of the question, entitled, from their personal characters, to the highest respect. In the Essay on Yellow Fever by Dr. Bancroft, originally delivered as the Gulstonian Lecture before the College of Physicians of London, and in a sequel to that essay, published in 1817, the question of the contagion of yellow fever is most ably discussed. This author's observations are particularly calculated to obviate an opinion of there being two varieties of yellow fever, one the common remittent fever of tropical climates, and the other a disease of a highly contagious and pestilential nature, said to have been imported into the West Indies by a slave-ship from the island of Bulam on the coast of Africa. This latter opinion of the importation of yellow fever was strenuously supported by Dr. Chisholm and Sir William Pym. The observations of the latter excited so much interest, that the Lords of the Privy Council were induced to apply to the College of Physicians for information on the principal points in dispute, "the contagious nature of yellow fever," and the peculiarity of its attacking "the same person only once in the course of his life." The College having, from want of personal experience, left these two points undetermined, application was made to the army and navy medical boards for a collective view of the opinions of the medical officers of the respective services, whose experience enabled them to adduce facts and observations in support, or in refutation of these propositions.

From the reports furnished by the naval service, of which alone Dr. Bancroft was permitted to make use, he has adduced evidence, in my opinion *satis superque*, to prove the futility of the diagnostics upon which it has been attempted to establish the existence of Bulam fever as a separate and highly contagious disease. Some of these diagnostics, the appearance of the eyes, the seat and nature of the headach, the presence or absence of the remission, &c. are vague, accidental, or uncertain. With respect to one of the principal diagnostics of the Bulam or infectious fever, "the black vomit," and gangrenous state of the stomach, Dr. Bancroft has well expressed the futility of all such criteria; for "the first," says he, "is the almost unerring harbinger of death, and the other can only be known after its occurrence. As black vomiting is a mortal symptom

never occurring it may be said in those who recover, and often wanting in those who die, its appearance in this disease must be much rarer even than death, and this circumstance, joined to that of its not being peculiar to the fever in question, render it very unfit to be produced as a diagnostic thereof." The chief value of a diagnostic is to enable us to ascertain at an early period the true nature of a disease ; but this refers to its consequences only. Upon this point Dr. Musgrave of Antigua remarks, "had Drs. Pym or Gilpin, or any one holding their opinions, practised in Antigua during the late epidemic, still prepossessed with the idea of black vomiting being distinctive of yellow fever, I venture to assert, without fear of contradiction, that he or they, spite of every preconceived notion, must in candour have admitted, that a disease at least answering in every respect the description given by themselves, could ostensibly be produced by miasmata alone."

This, according to Dr. Bancroft's view of the matter, the application of miasmata to the human body in warm climates, is the most frequent, or rather the only exciting cause of yellow fever ; that it is really a marsh remittent fever ; and he endeavours to establish the identity or near affinity and connection of the yellow fever with fevers notoriously and indisputably produced by marsh miasmata. The latter have certain peculiarities which he compares with the phenomena of yellow fever, in order to show the identity of the two diseases. The peculiarities of marsh fevers, all of which are observable in the progress of the yellow fever, are, according to Dr. Bancroft,—1. That of occurring in their simple and mild form of intermittents during the spring. 2. That of being exasperated, converted into remittent, and apparently into continued fevers, by excessive summer heat, and this generally with a great increase of malignity. 3. That of being reconverted or brought back to their mild intermittent form at the commencement of winter, and afterwards extinguished or suspended in cold countries by a continued frost. 4. That of most frequently and violently attacking strangers from colder climates, and more salubrious situations : And, 5. That of never being communicated from person to person by a contagious property. With so many proofs of identity in their cause, and of the nearest affinity in their symptoms,

and reciprocal conversions into each other, as well as in their effects on the human body, and their changes by heat and cold, &c., it would be unreasonable not to consider them as mere varieties of the same disease. "We might as well," says Dr. Rush, "distinguish the rain which falls in gentle showers in Great Britain, from that which is poured in torrents from the clouds in the West Indies by different names and qualities, as impose specific names and characters upon the different states of bilious or marsh fever."

In the attempt to establish another peculiarity of the Bulam or infectious fever, viz., the non-liability to a second attack, those writers who adopt this opinion do not appear to me to have been more successful than in their support of the former position. As I cannot at present enter into the arguments in support of this immunity from a second attack, nor into the very satisfactory arguments by which Dr. Bancroft has proved that even a repetition of attacks does not confer absolute immunity, I shall content myself with observing, that the evidence of numerous naval and military surgeons, upon which Dr. Bancroft overthrows this doctrine, is to me perfectly satisfactory; and my opinion upon this point is not a little strengthened by the following remark of Dr. William Fergusson, than whom no one has had better opportunities of informing himself relative to the point at issue. Dr. Fergusson observes—"Another piece of doctrine has been promulgated from the writings of the authors above alluded to—Sir William Pym and Sir James Fellowes, that the yellow fever cannot be received by the same subject more than once. Of this, again, we who live amongst yellow fever not only know nothing, but we see it contradicted by the daily experience of our lives."

I am here tempted to refer to the opinion of my distinguished predecessor Dr. Thomson, who, in the last conversation I had with him, a short time before his death, told me that he had been carefully considering the evidence for and against the contagious nature of yellow fever, particularly a French report on the subject, published about that time, and that he had come, contrary to his original prepossessions, to a conclusion against its contagious character. Those who are acquainted with Dr. Thomson's habits of patient and labo-

rious investigation, and his caution in expressing himself on doubtful points of pathology or practice, will be able to estimate the value of his testimony.

These two points, then, the contagious nature of yellow fever generally, and the non-liability to a second attack, being, in my opinion, completely disproved, I must now be permitted to observe, that I see no difference, *except in degree*, between this scourge of the West Indies and the bilious remittent, which I have so often seen at Batavia, at Prince of Wales' Island, at Seringapatam, and in various other parts of the East. That a yellow fever under certain circumstances, under great accumulation and concentration of its victims, may not become contagious, is what I am not prepared to assert; but I may safely affirm that I have seen numerous fevers, to all intents and purposes yellow, so far as the colour of the skin is concerned, and fevers also with black vomiting, which were not attended with any circumstances giving rise to a suspicion of contagion; nor were patients who had suffered an attack of this fever by any means exempted from a second accession. In short, between the yellow fever of the West, as described by numerous writers, and the bilious remittent of the East, I see every possible point of resemblance; and I can see no possible difference but what may be accounted for by season, by local peculiarities, or particular idiosyncrasies.

With this opinion of the identity of marsh fevers in all tropical regions, I proceed to offer a few remarks on the symptoms and treatment of the yellow or bilious remittent fever of warm climates, premising, that I hold it entirely foreign to the province of my chair to enter into any exposition of the theory of fever in general, or any lengthened detail of its pathology and cure. Yellow fever, like all other diseases, differs greatly according to the intensity of its exciting cause, the peculiar situation of the patient, and his natural habit of body. It occurs in its most aggravated shape amongst young and robust men recently arrived from temperate regions. Its approach is marked by lassitude, listlessness, reluctance to exertion, nausea, and chilliness; which symptoms are soon succeeded by strong arterial action, intense heat of skin, headach, flushing of the face, redness and suffusion of the eye-balls, uneasiness and pain of the stomach, oppression of the præcordia, and a white furred

tongue. The patient is distressed with an insatiable thirst, while he loathes almost everything in the shape of solid food. These symptoms are speedily succeeded by frequent, almost continued, efforts to vomit, with discharges, first of whatever the stomach happens to contain, and subsequently of bile, at first of a yellow appearance, afterwards green, and occasionally tinged with blood.

During this first and active stage of the disease the patient's fate is frequently determined; for, if not met by corresponding activity on the part of the practitioner, the foundation of irreparable mischief is frequently laid in the brain, the stomach, or the liver; for although, in most instances, even where the disease runs its course uncontrolled, a remission takes place within forty-eight, or at the utmost within seventy-two hours, yet this apparent remission is often the transition from inordinate action to perfect exhaustion, and is sometimes only a short prelude to that hopeless state which is speedily to terminate in disorganization and death. Dr. Gillespie, in his account of the diseases amongst the seamen on the Leeward Island station, very properly cautions young practitioners against a mistake very common with regard to the yellow or ardent fever, that of mistaking the fatal stage, which follows great and excessive action, and which accompanies sphacelus of the viscera, for a salutary crisis of the disease. During remissions, the pulse returns apparently to the condition of health, the skin becomes cool and moist, while the intellect, if previously disturbed, again becomes clear. After some interval this remission is succeeded by another paroxysm, apparently less violent than the former, because the patient's exhaustion, and that extreme depression of strength characteristic of advanced inflammation of the brain or stomach, render him unsusceptible of the former excess of action. In these renewed paroxysms, instead of intense febrile heat and strong arterial action, the warmth of the body and the frequency and strength of the pulse are sometimes less than when the patient was in health; but the pain and heat of the stomach become excruciating, with incessant strainings to vomit, which in most of the fatal cases are followed by hiccup and repeated discharges of matter resembling turbid coffee, more or less diluted, and also by the evacuation of similar dark matters from the bowels.

When the last mentioned train of symptoms occur, indicating a severe affection of the stomach and bowels, the patient's head is frequently but little affected, he remains sufficiently in possession of his intellects to know those about him, and to give distinct answers to questions put to him. In cases, again, where the disease fixes more particularly on the brain, the retching and black vomit just described do not so commonly occur, but instead of them, low muttering delirium, or coma, with convulsive twitches of the muscles of the face or other parts of the body, supervene. In advanced stages the tongue and teeth become covered with a dark brown fur; yellowness of the skin and petechiæ make their appearance; the urine, which is sometimes suppressed, and sometimes passed involuntarily, has a putrid smell and dark colour; the fæces are also exceedingly offensive, and of a putrid character. Hæmorrhages occasionally take place from the nostrils, gums, or other internal surfaces; the pulse becomes feeble, and intermits; the breathing laborious; portions of the skin assume a livid colour; the extremities grow cold, and life is gradually extinguished.

It seldom happens in severe cases of this disease that the brain and stomach are both equally affected, but in cases rapidly fatal, it is from lesion of one or other of these organs that the patient is destroyed. Those who die early in the disease generally perish from an affection of the head, with moderate vomiting; while those who have the stomach violently affected are usually found to have their mental faculties clear, though often weakened, and they seldom expire before the end of the fourth or beginning of the fifth day. Of the two symptoms which have been held more peculiarly to characterise this disease, the yellowness of the skin and the black vomit, the former begins in a few cases, within the first forty-eight hours, sometimes on the third, and frequently not until the fourth or fifth day. It is first commonly perceptible about the angles of the nose and mouth, gradually extending down over the neck and trunk, so as in some instances to become universal. This yellowness of the skin is ascribed by Dr. Bancroft to the presence of bile in the circulation, occasioned by the compression of the liver in the severe and protracted efforts in vomiting. And although I have never

myself seen this peculiar appearance of the skin until an advanced stage of the disease, it is necessary to state, that several authors, amongst whom are Drs. Dickson and M'Arthur, have seen this symptom previous to the occurrence of vomiting; and Mr. Dickinson asserts that vomiting does not always precede, nor does it always occur when the bilious suffusion takes place. The black vomit has been considered by some writers as bile altered in character, but it is now more generally and more justly considered as a bloody effusion from the internal surface of the stomach. For various arguments in support of this opinion, I must refer to Dr. Bancroft's work, and devote my remaining observations to a summary exposition of the appearances on dissection, and the means of cure in yellow fever.

The dissections of patients who have died of this fever have discovered appearances corresponding to the affection of the part most violently attacked by the disease. When the symptoms of an affection of the head have been urgent, the vessels within the cranium have been found turgid, and watery effusions, sometimes of a yellow colour, into all the cavities of the brain. The texture of the brain is sometimes increased in density, and on cutting into its substance the medullary part has appeared thickly spotted with red points, owing to the effusion of blood from the divided vessels; while it has occasionally happened, that some of these vessels have been ruptured previously to the death of the patient, and blood has been found effused into the substance of the brain. When the symptoms indicating a severe affection of the stomach have been predominant, traces of disorganization of this viscus have been discovered on dissection; the whole inner surface inflamed, portions of the villous coat abraded, and sometimes floating among its contents, which consist for the most part of the same dark coffee-like fluid evacuated during life. In the less concentrated form of this fever which I have frequently had occasion to see in India, the liver and spleen have often been found increased in size and weight, and Dr. Chisholm considers the liver as the organ principally affected in this disease.

In the treatment of Yellow Fever, two modes of practice have chiefly been pressed upon the attention of medical men—

the employment of blood-letting and the administration of mercury. Of the efficacy of the first, I consider myself entitled in some measure to speak from personal experience, having witnessed its beneficial effects in those fevers of the Eastern hemisphere, which I consider in every respect analogous to this scourge of the West; and in conjunction with this experience, every circumstance attending the usual progress of the disease seems to concur in pointing out blood-letting, in its earlier stages, as the most rational and effectual means of relief. Its more violent attacks are chiefly confined to strangers recently arrived from temperate climates; most of them young, vigorous, and robust. Its first stage is obviously one of great excitement, the indications of which are a hard, full, and strong pulse, a distressing sense of universal tension, a red starting eye, and parched skin ; while those who have fallen victims to the disease have generally exhibited, on dissection, traces of inflammation in various organs, especially in the head and stomach. To render blood-letting beneficial, it should be resorted to early, within the first twenty-four, or if possible within the first twelve hours; and to prove effectual it must be done copiously; any thing less than from sixteen to twenty ounces may be looked upon as mere trifling, when a patient's life is at hazard. In a disease so fatal, our hopes must rest on very active measures. In the class of subjects generally affected by this fever—the young and robust—the lancet should be used freely, and it should ever be kept in mind that the chance of success will depend much upon its being used within a few hours after the attack. Amongst a host of authorities in favour of this practice, I shall content myself with referring to the works of the late venerable Dr. Jackson ; and my own sentiments are more fully explained in the following passage of my Essay on the Diseases of European Troops in India :—

" I may safely assert, that neither in fever, nor in any other disease, have I ever had occasion to regret the employment of blood-letting ; while, on the other hand, I have frequently had to blame myself for its omission. Instead of confining the use of this evacuation to the most urgent cases of fever, where its use appears indispensable, I should be inclined in a great measure to reverse the rule, and to practise it in

every case where some peculiar circumstance does not forbid its use. Youth, plethora, vigour, and a recent arrival from Europe, are circumstances which, in the opinion of many of our Indian practitioners, will alone justify the employment of this evacuation in any disease, and are circumstances in which I should find many ready to acquiesce in its utility; but it appears to me, that although patients of this description will undoubtedly bear bleeding to a larger extent than men of an opposite description, yet this evacuation becomes no less necessary in older men, to obviate the tendency of the disease to fix upon and impair the functions of the liver, from which an increase of years affords them no exemption, and to which their residence in India, if of any duration, and the habits of the soldiery there, as certainly create a positive predisposition."

In a disease so intractable in its nature, so frequently fatal in its event, and so unmanageable by mild and ordinary methods, it is not surprising that recourse should have been had to mercury, the effects of which upon the animal economy, whether good or bad, salutary or deleterious, are in general abundantly powerful. The most common operation of this metal, when exhibited internally, is either to produce copious evacuations by stool, or to excite salivation; and in either case, benefit is derived from its exhibition. Dr. Bancroft assures us, that after much research upon this point, he has not been able to discover that the salivators were more successful than others. Indeed, if it is to salivation alone that we are to trust, I apprehend our efforts must frequently fail, for in a very able paper in the thirteenth volume of the Edinburgh Medical Journal, Mr. Shepherd has adduced the authority of various modern practitioners to show the inutility of attempting to affect the system with mercury during the inflammatory and active stage of yellow fever. Although Dr. Chisholm warmly acknowledges his obligations to Dr. Rush, and expresses his admiration and respect for his fortitude in pursuing the mercurial mode of treatment; yet Dr. Rush himself has candidly stated, that in the City Hospital of Philadelphia, where bleeding was sparingly used, and where the physicians depended chiefly upon salivation, more than one-half died of all the patients who were admitted. Upon the use of

mercury in tropical fever, the following are the observations suggested by my personal experience in India :—" In the common fevers of the Madras establishment, this is a remedy which, by a liberal use of the evacuations already recommended, may very generally be rendered unnecessary. Where, however, the patient has laboured under an indifferent state of health previous to the accession of urgent febrile symptoms, and where the use of purgatives alone seem inadequate to the restoration of healthy secretions, and natural alvine evacuations, I have frequently had recourse to it with the very best effects; and in the more severe forms of fever prevalent in India, it is a remedy reckoned indispensable. While some difference of opinion exists regarding the mode of its operation, there seems to be but one opinion generally prevalent regarding its extensive utility. On this subject I speak with diffidence, but I am inclined to think, that a more free use of bleeding and purgatives would, in a great many cases, even of these severe fevers, supersede its necessity."

As auxiliary means in the treatment of yellow fever, many authors have concurred in the commendation of purgatives, the first objects being, as expressed by Dr. Chisholm, freely to evacuate the *primæ viæ*, and to deplete the vascular system. In my opinion of the inutility and impropriety of emetics in this fever, I am happy to find myself supported by Dr. Bancroft, who very justly condemns them, from the presence of gastric irritability, which, for the most part, proves one of the most vexatious and troublesome symptoms of the disease. I am also supported by the same authority in urging the utility of the cold affusion, of which I entertain a very high opinion, and of the benefits of which I had occasion to witness a very remarkable instance in 1811, when placed in charge of a party of the 22d Dragoons employed at the taking of Batavia, and afterwards suffering severely from fever on board of a transport on the passage to Sourabaya, at the eastern extremity of the Island of Java. It will be seen that I have upon this, as upon other occasions, restricted myself almost exclusively to the commendation of those measures which my own experience warrants; but I never fail, in lecturing upon these subjects, to refer my pupils to the later observations of others. From recent conversations with army surgeons returned from

the West Indies, I am given to understand that the most approved treatment of yellow fever at present is by a combination of calomel and quinine, while bleeding is sparingly used.

Upon the treatment of the fevers which have on several occasions proved so destructive to the troops in Gibraltar and at Walcheren, I consider it unnecessary to enlarge, as they appear to me, in every essential point, akin to those of our East and West India possessions. On the former, many valuable observations are given by Dr. Gillkrest, and by Dr. Smith, of the Welsh Fusiliers, in the thirty-fifth volume of the Edinburgh Medical Journal, and it may not be out of place to notice here the following prophylactic measures suggested by Drs. Borland, Lempriere, and Sir Gilbert Blane, for the protection of the troops at Walcheren in 1809.

"The troops should not be oppressed with duty, or enjoy less than four nights in bed. On the evenings of the nights on which they mount guard, an extra allowance of spirits to each man would be essentially beneficial; and when relieved next morning, a comfortable warm breakfast of strong coffee should be in readiness.

"The barracks ought to be of the best description, well guarded from cold and damp, with boarded floors; stoves and flues, suitably directed to convey an equal temperature to the remotest corners, to be placed in each room. On no account should ground-floors be used for sleeping apartments. The more lofty the buildings the better; for the tenants of the upper storeys not only enjoy the best health, but when taken ill have the disease in the mildest form—an instance of which came under our observation when we visited Fort Ramakins; and the same is confirmed by the experience of the natives.

"The clothing of the soldier should be of warm quality, and in the best repair. He should be equipped with woollen stockings and flannel waistcoats, the frequent changes of which merit particular attention from his officer. The shoes should be strong, of the best waterproof leather, to guard against the peculiar damp of the country. The pantaloons should be of a spongy warm texture, blue or gray, in preference to white, that there may be no temptation to adopt the pernicious custom of cleaning them with wetted pipe-clay.

"The diet, especially in the sickly period, should be nutri-

tive, and the broths well spiced with pepper; during which season a small portion of unmixed spirits might be usefully allowed early in the morning."

In concluding these observations, I may be permitted to reiterate my opinion, that the yellow fever is nothing more than a highly concentrated form of the marsh remittent; that the yellowness of the skin and black vomit, which have been supposed peculiarly to characterise this fever, are accidental and adventitious symptoms, not supervening, for the most part, until the patient is beyond the reach of medicine, and therefore unfit to guide our practice. In fine, I consider this fever, whether raging in the jungles of India, on the coast of Java, or on the shores of St. Domingo—whether at Seringapatam, at Gibraltar, or at Walcheren—whether in the garrison of Sierra Leone, on board the Bann, or in the steamers on the Niger, as essentially of the same nature; its symptoms, its dangers, and its treatment alike, and that this treatment will be most successful when it is most calculated to lesson high vascular action, to subdue local inflammation, and to obviate the disorganization of important organs.

TROPICAL DYSENTERY.

This disease has from the most remote ages been looked upon as one of the principal scourges of an army, both in temperate and in tropical climates. In Sir John Pringle's work on the diseases of the army, we have an account of the dysentery as it occurred in his time; and for a detail of its extensive ravages in the Peninsular army, I would refer to Sir James M'Grigor's paper on the health of that army, so frequently quoted in the introductory part of the course. From the details there given, it would appear, that in a period of thirty-one months, from December 1811 to June 1814, nearly 23,000 cases of dysentery and diarrhœa occurred, and that dysentery was the disease which of all others produced the greatest mortality. A table of all the diseases which terminated fatally in the Peninsular army during the above period, exclusive of the wounded, gives

the following results:—In the year 1812, 2340 men perished from this disease; in 1813, 1629; and during the first seven months of 1814, 748; in all, 4717. What may be the comparative frequency and fatality of this disease in our West India Islands, I am unable to state with precision, but, from a table published in my work on the diseases of the European troops in India, it appears that, at the principal stations of the Madras army, the deaths from dysentery during the year 1807, when that table was made out, were 515, more than double the number of deaths from fever, the next most fatal disease.

To an account of the phenomena and treatment of this disease, as it occurred under my own observation in various parts of India, I must necessarily confine myself, premising the following remarks of Sir James M'Grigor on the treatment of the dysentery in the Peninsular army:—"The practice," says he, "of Dr. Buchan, Dr. Fergusson, Dr. Somers, Dr. Erly, Dr. Vetch, Drs. Charles and James Forbes, Dr. Walker, (I may add the lamented names of the late Drs. Gray and Cabell, and indeed of most practitioners), was to attack the disease vigorously by depletion on its earliest commencement. I myself," says Sir James, "had seen much of the benefit of this practice in and about Portsmouth, in the years 1810 and 1811, with many dysenteric cases received from the Peninsula. The plan of Dr. Somers appeared so judicious, and proved so successful on the first attacks of the pure unmixed disease, that I recommended its being generally followed in the army."

The particular details of this practice have been published by Dr. Somers himself; and, referring to his tract for the most successful mode of treatment in the form of the disease which attacked our army in the Peninsula, I proceed to offer a few observations on this formidable disease as it assails the army in India. This limit in the application of my remarks I wish to be particularly noted, because, without pretending to say whether or not our European nosologists have rightly characterised the disease as it occurred to them, I must take the liberty of observing that, in the definition of this disease given by Dr. Cullen, comprised in three lines, there are at least three circumstances not characteristic of India dysentery:—1. The existence of *pyrexia*—the distinctive character of the class in which Dr. Cullen has placed dysentery—does not always usher

in the disease as I have been accustomed to meet it; and I have known this disease to have very seriously, perhaps irreparably, injured the intestinal canal before any urgent symptoms of pyrexia become either distressing to the patient or conspicuous to his medical attendant. 2. The fever attendant upon dysentery is stated unequivocally by Dr. Cullen to be contagious. Now I speak, I think, within bounds, when I say, that I have treated not less than two thousand cases of this disease, and have never once met with a circumstance tending to create a suspicion of contagion. 3. Dr. Cullen states the fæcal matters to be mostly retained; and in his description of the disease, observes that when they do appear, it is in the form of small indurated masses, termed scybalæ. The appearance of these indurated masses of fæcal matter is, on the contrary, an occurrence very rare in tropical dysentery. In a recent communication from Dr. Parrat of the Royal Artillery, he says:—"In reading your work, I find your observations very apposite to the dysentery of China. In fact, the diagnostic symptoms which we are led to look for by Cullen and most nosological writers, are quite at fault."

Although little disposed, in general, to occupy my time in critical disquisitions of this kind, I consider it my duty to animadvert on these points, my object being to apprize young men who may be destined to serve in our Indian possessions, how little the flux or dysentery existing amongst the troops there resembles the description given of it by some writers at home. A young man prepossessed with the idea of pyrexia being an essential and primary constituent in every form of dysentery, would naturally be inclined to make light of any case in which this was not remarkable, and might thus lose the best opportunity of being useful to his patient. Prepossessed with the idea of the disease being contagious, he might waste his time in useless precautions, or deprive his helpless patient of that assistance from others, of which dysenteric cases stand so much in need. Adopting the idea of scybalæ lodging in the bowels, he might be induced to persevere in the repetition of purgatives, which in some circumstances and stages of this disease, I hold to be worse than useless.

The remote causes of dysentery in India are conceived to be heat, particularly when combined with moisture; the im-

moderate and indiscriminate use of unripe or unwholesome fruits; the abuse of spirituous liquors; exposure to currents of wind and to noxious night-dews; and in whatever way these causes may act in the production of dysentery, we are assured by Dr. Johnson, that in every case of the disease which has come within his observation, two functions were invariably disordered from the very outset, and soon drew other derangements in their train. These were the functions of the skin and of the liver, and "I defy," says he, "any one who has minutely regarded this disease at the bed-side, to produce a single instance in which these functions were carried on in a natural manner at any period of the disease." But referring to Dr. Johnson's work on the "Influence of Tropical Climates on European Constitutions," for a full account of his ingenious views upon this subject, I proceed to observe, that I have been strongly impressed with a belief in the existence of two distinct forms or varieties of dysentery as it occurs in India. The one is an acute disease, confined chiefly to the large intestines, and denominated by some of the Indian practitioners *Colonitis*, a term which does not necessarily imply the existence of a flux, but corresponds extremely well with the appearances on dissection; the other is a more chronic form of disease, is more extended in its site, and has been sometimes termed Hepatic flux. These two species of the disease correspond nearly with the acute and chronic dysentery of some other writers, particularly of Mr. Bampfield, the author of a valuable work on tropical dysentery. This author has indeed carried his subdivision still farther, and has enumerated three varieties of the former and five of the latter species. On this arrangement Dr. Johnson makes the following remark, in which I most heartily concur:—"This arrangement," says he, "is certainly logical and luminous, but I can scarcely see any advantage in thus splitting down diseases into so many minute varieties. It was the celebrated Cullen who gave currency to this notion, swayed perhaps more by the example of preceding nosologists than by his own excellent judgment. And, upon the whole, I greatly doubt whether such minuteness of diagnosis is often possible, or if it be, whether it is of any avail in actual practice."

On the first arrival of European troops in India, it is an

inflammatory affection of the large intestines, the disease which has been termed colonitis, that principally proves destructive to them. The manner in which a tropical climate operates in giving origin to this inflammatory affection of the colon, did, and still does, appear to me involved in some obscurity; for although the remote causes formerly assigned—heat, moisture, night-dews, abuse of fruits and intoxicating liquors, may be considered as powerful agents in the production of fluxes, it appears to me difficult to account for the very frequent occurrence of severe and extensive inflammation of the colon, on the first arrival of a European regiment in India, before many of these causes can possibly have taken effect, before the climate can well be supposed to have exerted its baneful effects on the constitution at large, or on the hepatic system in particular, and before the soldiers have become habituated to that abuse of the most pernicious description of spirits, which subsequently renders their diseases frequent, obstinate, and incurable.

Although I am not inclined to encourage the practice of pampering soldiers, but rather disposed to recommend that they should be habituated to bear the evils which they cannot shun, yet it is necessary upon their first arrival in an Indian climate, to confine them to their barracks during the heat of the day, and in addition to the usual parades morning and evening, to encourage such amusements and gymnastic exercises as will employ their minds and promote their health. There are such variations in the climate in different parts of India that something must always be left to the judgment and experience of the surgeon, and the following recommendation deserves notice. It is from a communication to the Medical Board at Madras, by the late Sir Simon Heward, a very experienced medical officer of the East India Company's army, and refers to a very fatal dysentery which prevailed in the 30th regiment at Wallajahbad in 1807:—"The confinement of the men to their quarters was from the hour of eight A.M. till four P.M., and is still continued. This was attended with such beneficial effects, that in about a fortnight after, the admissions not only became fewer in number, but, what was also observable, the disease, from being highly aggravated in its symptoms, became gradually less so, and from that period took on daily

more and more the character of common diarrhœa. Now as there was not during that time any change or alteration in the diet of the men, or deviation from the established discipline of the regiment, which appears to be guided by that rule best calculated to preserve health, I am disposed to attribute this mitigation in the symptoms of the disease to the confinement of the men to their barracks; and the regulation having been found of such benefit and importance to the soldiers' welfare in this instance, I trust it may at no time be overlooked on the landing of a new regiment from Europe, for I am persuaded, had the plan been adopted on the arrival of the 30th regiment at this station, much of that distress and suffering in the first place would have been avoided, and many subsequent deaths ultimately prevented."

. In whatever way the acute inflammatory form of flux may be excited, it commences in general with much of the appearance of a common diarrhœa, occasional griping pains in the bowels, frequent and unseasonable calls to stool, with an irresistible inclination to strain over it. The evacuations are in general copious, at first of a fluid consistence, and without any peculiar fetor; they are sometimes streaked with blood, and at other times a small quantity of blood is voided in a separate form, unmixed with the fæcal matter. The pulse in this early stage of the disease is seldom altered, the heat of skin but little increased, and the tongue little, if at all, changed in its appearance. The patient soon begins to complain of fixed pain in the hypogastrium, more or less acute, sometimes peculiarly urgent in one or both iliac regions, and often to be traced along the whole course of the colon. The evacuations now become more frequent and less copious; they consist chiefly of blood and mucus, or are composed of a peculiar bloody serum, not inaptly compared to water in which beef had been washed or macerated; the tongue is now for the most part white and loaded; the skin is either parching hot, or covered with profuse, clammy perspiration; the pulse is still frequently found to be little affected, only assuming an increased quickness, without any other remarkable feature. But at times the pulse, without much increase of velocity, will be felt full and bounding, with a peculiar thrilling sensation under the finger. This state of the pulse always denotes extreme dan-

ger, and shews that the disease is rapidly hurrying on to that final stage in which the lassitude and dejection so conspicuous throughout its course, are converted into the utmost degree of anxiety, depression, and fear of death.

The discharges by stool, which are frequently involuntary, are now accompanied with the most intolerable fetor; they are frequently mixed with shreds of membrane, and quantities of purulent matter; a protrusion of the gut, forming a complete *prolapsus ani*, often takes place, and cases are not infrequent where a portion of the inner coat of the intestine, amounting to some inches, has been thrown off in a state of mortification. Even from this deplorable state I have known recoveries take place; more frequently, however, the pulse, which in some cases had given but little indication of the mischief going on, begins finally to sink; pain ceases; delirium supervenes; frequent hiccup, accompanied with vomiting, becomes exceedingly distressing to the patient; his features change; a quantity of sordes collects about the roots of the teeth; his skin becomes covered with a cold clammy sweat; a peculiar cadaverous smell is emitted from the body; and death comes at last as a desirable relief from this loathsome state of existence. The periods occupied in passing through the different stages I have described are various, the disease frequently proving fatal within a week from the patient's admission; and at other times its duration is protracted to two or three weeks, although I think it seldom exceeds this, where the disease is confined solely to the inflammatory affection of the colon.

The more chronic form of disease, spoken of as the hepatic flux, of which the complaint above described is sometimes a precursor, is more peculiarly incident to men after being some time in India, and more frequently attacks those who, from habit and constitution, are less liable to violent inflammatory affections, but more prone to irregular and disordered secretions of bile. This flux, like the other, often assumes at its commencement the appearance of a common diarrhœa, and becomes afterwards characterised by frequent and severe fits of griping, resembling cholic pains, particularly urgent about the umbilical region. Each attack of griping is generally succeeded by a call to stool, and the evacuations are always unnatural in

colour and consistence, free from any admixture of blood, but generally of a yeasty or frothy appearance, and accompanied with large discharges of flatus; while in passing they are attended with a sense of scalding about the anus. The patient, after each evacuation, feels considerably relieved, and hopes to enjoy an interval of ease, but the recurrence of the griping, accompanied with a sensation of air passing through the bowels, and succeeded again by a call to stool, give him little respite. From the commencement of the attack, the patient complains of nausea, want of relish for his food, and preternatural thirst, attended often with a disagreeable taste in the mouth. The tongue is furred or loaded, and not unfrequently covered with a yellow bilious coat. The pulse is quickened and the skin parched.

After these symptoms have existed for some days, the stools for the most part become and continue of a whitish appearance, insomuch that the disease is often termed by the soldiers the *white*, in contradistinction to the *bloody* flux. The griping pains continue, and sometimes the patient feels a permanent degree of oppression, rarely amounting to pain, about the region of the epigastrium. The nausea and loathing of food increase, accompanied with hiccup and bilious vomiting—the latter a symptom peculiarly troublesome, as it leads to the rejection of everything offered in the shape of food or medicine. The thirst becomes more and more urgent; lassitude and debility increase, emaciation succeeds with rapid strides, the quickness of pulse continues, and the skin often communicates a peculiar greasy sensation to the touch. Under these symptoms, more or less aggravated, the patient continues to labour for weeks, and not unfrequently for months; so that this form of flux often does an irreparable injury to the constitution, and reduces the patient to a state of emaciation and debility, in which his life is held by a very precarious tenure. It does not of itself, however, generally prove fatal, but either terminates in recovery, or the patient is carried off by the occurrence of an abscess in the liver, or by the accession of ulceration and mortification in the course of the colon.

In patients dying of the acute or inflammatory form of flux, the following are the appearances which usually present themselves. On laying open the abdomen, a quantity of serum,

sometimes mixed with coagulable lymph, is found accumulated in this cavity. The omentum is generally shrunk, firmer than usual, and feels doughy, with slight adhesions to the convolutions of the bowels; at other times thin, perfectly transparent, and destitute of fat; the latter appearance chiefly confined to those cases where the disease has been unusually protracted, and complicated with a liver affection. The stomach is seldom altered in its appearance or structure. The small intestines are often perfectly sound; sometimes exhibiting slight inflammatory patches, to which patches the omentum is occasionally found adhering. The great intestines, again, the principal seat of disease, show the strongest marks of inflammation in all its stages—some portions exhibiting externally a slight inflammatory redness, while others are marked by the highest degree of lividity. In some cases parts of the gut are found to have given way, so as to permit the escape of air and even of fæces into the cavity of the abdomen. In these destructive effects of inflammatory action, the cœcum and sigmoid flexure of the colon are found more particularly to participate. On slitting open the gut, a quantity of fetid air makes its escape, and the natural dimensions of the canal are in many parts found much lessened by the thickening of its coats. The villous coat is found in some instances simply abraded, in others ulcerated and besmeared with a bloody mucus, mixed with specks of purulent matter. In a few instances I have seen parts of this coat exhibit the pustular appearance, which has been compared by Sir George Baker and others to small-pox. Extravasated grumous blood, in considerable quantity, is sometimes found in the colon, but the appearance of hardened lumps of feculent matter in the form of scybalæ, is, as formerly observed, very rare. While diseased appearances are thus so remarkable in the intestinal canal, and very often confined entirely to the parts situated below the valve of the colon, the liver is frequently found free from even the most trifling appearance of disease; at other times it is simply and slightly altered in colour, without any change of structure. In old residents and hard drinkers it is not unfrequently enlarged and indurated. The coats of the gall-bladder are occasionally thickened; and the bile itself in some degree inspissated.

Many of the appearances just noticed, of which it is not

easy to convey an idea by verbal description, are well represented in the splendid plates of Sir James Annesley's work on the diseases of India and of warm climates. In looking into my work on the Diseases of the European troops in India, the first edition of which was published so long ago as 1818, it will be seen that the ravages of disease so generally conspicuous in the cœcum and sigmoid flexure of the colon was a feature which very early attracted my attention; and here I cannot deny myself the gratification of again referring to Dr. Parrat's letter written after his return from the expedition to China. He speaks of the disease "being confined almost exclusively to the cœcum and sigmoid flexure of the colon. Such fearful ravages as were witnessed by the medical officers in the China expedition can scarcely be described in sufficiently strong terms—sloughs and gangrene taking place often apparently in three or four days, with perforations through the whole of the coats of the intestines. Disease of the liver was *rare*, *most rare*, but not so of the lungs and spleen. There appeared a strong sympathy between the mucous membrane of the bowels and respiratory organs. One of the most remarkable pathological characters was the abrupt termination of the fearful ulceration at the ileo-cœcal valve."

Before proceeding to offer any remarks on the treatment of dysentery, I think myself entitled to conclude, with Mr. Bampfield, that hepatic inflammation and dysentery are not so frequently co-existent in India as has been commonly stated and believed. Coupling the preceding detail of symptoms with the appearances on dissection, the slight degree of constitutional derangement, with the violence of the topical affection, I have been led to consider the colonitis, or acute form of flux, as more of a local disease, and more under the influence of local remedies, than has generally been imagined; to look upon it as a disease almost exclusively confined to the large intestines—an inflammation, in short, of this part of the canal, tending rapidly to mortification, and having in a great proportion of cases little or no connection with disease of the liver. Even allowing, as Dr. Johnson seems to suppose, that a diseased action of the liver and a vitiated state of the biliary secretion always precede the attack of colonitis, and are in some measure the cause of the latter affection, still

in the state in which we often meet the disease, it will be of little avail to exhibit remedies calculated to restore a healthy action to the liver, while the patient is dying of mortification of the colon. In the chronic or hepatic form of flux, again, many circumstances combine to induce us to consider it more of a constitutional disease than the preceding. The circumstance of its prevailing chiefly amongst men some time resident in India, the degree of fever which is always more or less conspicuous, the diseased secretions apparent in the stools, and in the matter ejected by vomiting, all tend to mark a disease in which a more general derangement of the functions of the glandular viscera of the abdomen and of the intestinal tube takes place. That in this disease the functions of the liver, the stomach, and upper part of the intestinal canal are greatly impaired, seems obvious; of which the frequent attacks of vomiting, the vitiated secretions, the passing of indigested portions of food along with the fæces, and the rapid emaciation of the patient, appear to me abundant proofs. While, then, in the acute form of disease, our attention is to be directed to the diminution of a violent inflammatory affection of the colon, threatening to terminate in mortification and death, in the more chronic form of disease, our object is to restore healthy secretions, and to obviate a general affection and tendency to disease in the chylopoetic viscera, without a marked inflammation of any particular organ.

With these views of the indications in the treatment of dysentery, I proceed to observe, that, in the more acute form, or inflammatory stage of it, blood-letting is the remedy upon which our chief dependence must be placed. But in expressing a favourable opinion of this practice, I must candidly own that it is grounded more on the ravages of inflammation so universally apparent in the dead, than on any repeated or extensive experience of its beneficial effects in the living. In those cases of dysentery in which I have employed bleeding, the majority have, I think, terminated favourably, and of those in which the result has been fatal, the appearances on dissection have been such as to excite a sentiment of regret at not having carried the evacuation farther. I am now indeed satisfied, that in the cases of dysentery which occurred in the Royals, on our first arrival in India, blood-letting was not

practised to a sufficient extent. The prejudices against it at that time existing in India, and the state of our men's constitutions, after a voyage of full five months, without having touched anywhere for refreshments, were circumstances which restrained us, more than they ought to have done, from the use of this evacuation; but that the utility of this remedy may not rest, either upon any acknowledged error of mine in its omission, or upon any conjectural opinion in its favour, I beg leave to quote the following passages from Mr. Bampfield's essay:—

"From the history and explanation of the symptoms, causes, and consequences of this disease, the reader will hardly be prepared to learn, that the propriety of bleeding in tropical dysentery should be questioned; that a large proportion of medical practitioners in both Indies not only discountenance the practice, but have never employed the remedy; and influenced by them and long-established practice or usage, many of the old European inhabitants are prejudiced strongly against it. Hence its recommendation must rest upon its merits and utility, and its employment be sanctioned only by its efficacy. I am able to prove its utility in tropical dysentery by the cases annexed; and I hope to vindicate the principles on which it is employed, by establishing a particular identity of some symptoms in dysentery and enteritis, which are characteristic of intestinal inflammation, and a further analogy between it and inflammation of other viscera possessed of secreting membranes, whose peculiar functions differ from the intestinal. My experience justifies the employment of it in dysentery, and it should be laid down as a rule of practice, that venesection should be early and universally employed in all cases of dysentery of the inflammatory variety, when there is a fixed, constant, and acute pain of the abdomen, accompanied by fever and constipation. It is employed with equal propriety and advantage when the rectum discovers the high state of inflammation formerly described." In the valuable work on the Diseases of Bengal, by the late Mr. Twining, he observes, that "the cure of severe cases of acute dysentery in plethoric patients should be attempted by the early, free, and repeated use of the lancet; with the aid of every other means by which we can subdue local inflammation and pyrexia. It will in

general be requisite to bleed from the arm two or three times at the interval of ten or twelve hours, and to take as much blood each time as to decidedly reduce, and permanently keep down, any frequency and hardness of the pulse that may exist. And twelve or fourteen leeches should be applied soon after each general bleeding to that part of the belly where pressure causes the greatest pain."

I have already had occasion to notice the favourable opinion entertained by Sir James M'Grigor and Dr. Somers of blood-letting in dysentery; and to the late Dr. White, who died in Egypt from inoculating himself with the matter of a plague bubo, the profession is also much indebted for having shown the safety and utility of blood-letting in this disease. Dr. White, in a letter addressed to his late Royal Highness the Duke of York, published in the Medical and Physical Journal, has recommended it to be pushed *ad deliquium*. The circumstances, however, attending the death of this individual, from an ill-judged experiment on himself, induced many to discountenance the practice which he recommended in dysentery, and to look upon it as the suggestion of a well-meaning but hot-headed medical enthusiast. But the practice of blood-letting in dysentery is sanctioned by much more ancient authority than this; for besides that of the distinguished military surgeon, Leonardus Botallus, Trallian has recommended general bleeding in this disease to the extent of "two heminas," or little less than twenty ounces. Prosper Alpinus also, in his work De Medicina Egyptiorum, approves of venesection; and, contrasting the artificial abstraction of blood with the quantity which the patient must necessarily lose if the disease is not subdued, has the following remarkable expression:—"Nos dicemus, si non mittatur sanguis, atque eo modo statim in principio divertatur fluxus ab intestinis, multo sane majorem sanguinis copiam per alvum, perseverante illo affectu, emanaturum; qui longe plus quam arte facta vires resolvet; optimum itaque esse remedium dysentericis, modicam sanguinis evacuationem existimo." Although I quote these opinions in support of the practice of blood-letting in dysentery, which I conceive to have been formerly too much neglected, I am quite aware that the soldier, on his arrival in the tropics after a long voyage, during which he has lived full and taken little

exercise, is in a different condition from one who has been debilitated by long residence in an unhealthy climate. The first, in many instances, would require general and the second only local bleeding, and the young surgeon must ever bear in mind that in unfavourable climates it is desirable that the disease should be removed with the least possible expenditure of the patient's strength and vigour, otherwise he frequently becomes a victim to epidemics, or to the periodical endemic diseases sometimes prevalent in tropical climates.

The next important remedy which has been recommended in the treatment of dysentery is mercury; and, however highly I am disposed to think of this remedy in the chronic form or advanced stages of the disease, I have never been able to see the benefits of its exhibition in the acute inflammatory affection of the colon. In compliance with the practice prevalent at Prince of Wales Island, when the Royals landed there in 1807, we were induced to prescribe mercury in our dysenteric cases to the extent of producing profuse salivation; but this practice was speedily abandoned from being found decidedly unsuccessful, and from our soon ascertaining by dissection that these cases were not dependent upon any conspicuous disease of the liver, which we had been led to expect, and in which view mercury was thought an appropriate remedy. Having never resumed the general use of mercury in the acute dysentery, at any subsequent period of my service in India, I am unable to say more of it from my personal experience; but it is necessary to notice the use of this mineral, in the form of calomel combined with opium, from which we are assured by Johnson, Annesley, and others, that the most essential benefit may be derived; and in urgent cases it is recommended to be given to the extent of a scruple, combined with two or three grains of opium, twice or thrice in the twenty-four hours. As I have no experience to guide me in speaking of this treatment, I give it chiefly on the authority of Dr. Johnson, who first recommended the practice.

If, in the acute form of dysentery, I refrain from any general or indiscriminate commendation of this powerful medicine, it is only to offer my testimony more strongly to its beneficial effects in the chronic form of the disease. The general success of mercury, under every form, in the cure of

hepatic fluxes, shows the extensive powers of the medicine, and the little comparative importance of the form in which it may be administered—a point which, with some practitioners, seems to me to claim an undue share of attention. The quantity of the medicine to be exhibited must vary greatly in different individuals—it is always to be carried the length of producing considerable ptyalism—and this, wherever the exhaustion of the patient does not forbid it, is to be kept up without intermission until natural secretions return, and the stools resume a healthy appearance. For the profuse salivations, which many suppose necessary, I have never heard any good reason assigned; while the relaxation and debility of the patient, partly induced by the medicine, and partly by its rendering him incapable of taking the little sustenance to which he might otherwise be inclined, seem very strong objections to this practice. The employment of ipecacuanha in various forms, and in different combinations, meets with the approbation of numerous experienced practitioners; and in the chronic form of disease, both vegetable and mineral astringents are recommended.

Upon various auxiliary and topical means employed in the treatment of dysentery, I cannot here enlarge; they chiefly consist of laxatives, sudorifics, warm bath, topical bleeding by leeches, blisters, and injections. The various circumstances in which these are indicated, and the various symptoms they are calculated to relieve, will readily suggest themselves; but I cannot help remarking, that, from the view I take of the topical nature of the colonitis or acute form of flux, I am induced to attach a very considerable importance to topical remedies, particularly to leeching, blisters, and astringent injections. And I conclude by again observing, that, in order to establish a rational and discriminating mode of treatment in dysentery, we must ever hold in view the leading distinctions in its nature, which it has been a principal object of these remarks to point out.

This disease when it occurs in an acute form, with all its usual diagnostics, is easy of detection, and in general leads to a practice sufficiently active and amply successful. "It may," says Dr. Chisholm, "be generally observed, that regular acute hepatitis is a very tractable disease if early known, and suitable means promptly and judiciously administered." It is not, therefore, by this well-marked form of the disease that so many lives are lost, and to which the health and vigour of so many Europeans are prostrated in tropical climates; but in these climates obscure and ill-marked cases of liver disease steal upon us unawares, and proceed to the extreme, from which there is no chance of recovery, without giving either patient or surgeon a sufficient degree of alarm.

While, in a great majority of cases, affections of the liver are obviously the joint effects of climate and intemperance, we find them in others the result of climate alone; and in such cases they are often very obscurely marked. It is a singular fact that, in a register of deaths kept in the regiment with which I served in India, in a period of seven years, and out of upwards of five hundred deaths, twenty-seven only are ascribed to hepatitis. This, however, I am persuaded, is not the proportion which this disease bears to the other fatal diseases of the country, for this register shows only the disease under which a patient was admitted into hospital; and many have, no doubt, been registered under the head of fever or dysentery, where symptoms of these were alone conspicuous at the time of their admission, while eventually they have died of diseased liver. Upon the relative proportion of these diseases in India and other quarters of the world, much valuable information will be found in Mr. Marshall's sketch of the geographical distribution of diseases, in the thirty-eighth volume of the Edinburgh Medical Journal; and also in a valuable Prize Thesis "On the Influence of Climate on Health and Mortality," submitted to the Medical Faculty of this University, in 1837, by Dr. Arthur S. Thomson.

There is little danger of our neglecting or overlooking those acute cases of the disease which are attended with severe

pain in the region of the liver, impeded respiration, quick and hard pulse, with the other symptoms enumerated by nosologists as characteristic of hepatitis. It is therefore more my present object to direct attention to some of the symptoms characteristic of those milder or more chronic forms of the disease, where pain is not urgent, and where we want this guide to direct us to the seat of the evil. The class of patients to which my experience has been chiefly confined is not perhaps the most favourable for making observations on the state of mind accompanying disease; but the depression of mental energy in most cases of hepatitis is sufficiently conspicuous to arrest the attention of the most superficial observer. The patient is generally overcome with a degree of langour, listlessness, reluctance to exertion, and aversion to enterprise, for which no adequate cause is conspicuous, and an apprehension and alarm exist which no external symptom seems to justify. The sufferer is prone to enter into a detail of his miserable feelings—at the same time obviously labouring under the greatest difficulty in explaining his sensations accurately. Pain, as I have already hinted, is not in general urgent; and when more distinctly complained of, it is, I think, frequently described as occupying the epigastric rather than the right hypochondriac region. It is occasionally found extending up the side, and reaching to the top of the right shoulder, where a gnawing or aching sensation is experienced.

The patient generally speaks of a sense of oppression, fulness or stuffing about the lower part of the chest, leading him to press upon the part affected, from which he obtains a momentary relief. In some instances a distinct sensation is felt as if a circumscribed solid mass was appended internally to the right side; and when the patient lies on the opposite side, he experiences what has been often and well characterized as a dragging pain. By a manual examination of the side, we are sometimes materially assisted in ascertaining the existence of a liver affection, particularly in its advanced stages, when emaciation has proceeded to a considerable extent. And it is perhaps here worthy of remark, that I have met with some patients who, although they could themselves press the side freely, yet shrunk from the hand of a stranger the moment it was applied, as if it occasioned them exquisite

pain. In such cases we must not be deceived; but, by pressing more firmly on the side, by trying whether the patient can bear the application of our hand to the opposite side, and by trying whether he can bear pressure with his own hand on the region of the liver, we are to satisfy ourselves whether any unusual susceptibility, tenderness, or pain in that region *actually exists.*

Such are the principal symptoms and feelings referable to the liver itself. The pulse, in cases of chronic hepatitis, does not afford any decided criterion, until its increased quickness, accompanied with fits of rigour, alternating with sweatings, thirst, and restlessness, gives reason to apprehend the formation of matter. Respiration is often impeded, and may, for the most part, particularly if accompanied with dry tickling cough, be considered as marking inflammation of the upper or convex surface of the liver. Irritability of the stomach has, on the other hand, been justly held to denote the existence of inflammation on the lower or concave surface of the liver; and, indeed, in all severe affections of the latter organ, a peculiar irritability of the stomach exists, marked by nausea and frequent vomiting, an appetite frequently capricious, but not always defective. The state of the alvine discharge is always particularly deserving our attention in cases of hepatitis. The disease generally commences and often continues, with a constipated state of the bowels, the stools being both less frequent and more scanty than usual. The evacuations also are often remarkable in colour, being sometimes darker, sometimes lighter than natural—often alternating in this way, according to periodical accessions of activity or torpor in the liver, and an alternate increase or diminution in the secretion of the bile. The urine is scanty, and frequently deposits a copious fiery sediment. The peculiar saffron-ness of complexion and jaundiced eye, which some authors have held to be particularly characteristic of liver disease, I do not dwell upon, observing that, although in chronic cases this may assist our diagnosis in Europe, and although, perhaps, it may generally originate in diseased liver, or indicate a predisposition to that affection, yet we see it so frequent in India that as a diagnostic symptom of disease, it becomes comparatively unimportant.

On dissecting patients who have died of hepatitis, the appearances of course differ materially, according to the rapidity and violence with which the symptoms have proceeded. In acute cases of the disease, when it proves speedily fatal by terminating in suppuration, it is not uncommon to find one or both lobes of the liver almost wholly converted into matter, partly serous and partly purulent, confined in a sack formed by the peritonæal coat of the organ. In a few cases of this kind I have found the diaphragm eroded, and the matter communicating with the extreme branches of the bronchiæ, through which, when the patient has survived for any length of time, it has been discharged by expectoration. In many instances, an extensive adhesion is formed between the liver and transverse arch of the colon; from which it is apparent that the matter may thus find its way into the intestinal canal, and be discharged by stool. Although I believe that abscesses of the liver have occasionally been discharged in this way, I have never really seen such a communication in the dead body. In the chronic form of disease, instead of meeting with an abscess of any remarkable size, we often find several small distinct collections of pus, similar to what are termed vomicæ in the lungs. The whole mass of the liver, in such cases, is generally altered in colour; it assumes an appearance as if par-boiled, and becomes much firmer in texture than natural; insomuch, that on cutting into its substance, a sensation is communicated to the hand of the dissector as if his knife were passing through a cartilaginous mass. The small quantity of blood which flows from an incision into a liver in this indurated state is also remarkable. Although white spots on the surface of the liver, and tubercles in its substance, with other anomalous appearances, are sometimes met with in India, yet in that country such appearances are comparatively rare, while suppuration and induration, the more common and legitimate results of a preceding inflammation, are extremely common. The gall-bladder does not exhibit any general or uniform morbid appearance. Sometimes it is a little thickened in its coats, and consequently diminished in capacity, while the bile itself is frequently found thickened or inspissated.

In the treatment of hepatitis, of the symptoms and consequences of which I have now given a brief sketch, our most

strenuous efforts should be directed to prevent suppuration; for although I do not mean to assert, that whenever the liver suppurates, the patient must inevitably die from this cause, yet I believe that after such an event very few recoveries take place, and that an individual has little chance of enjoying any thing like health and comfort under the vicissitudes of a soldier's life. Recoveries would be more frequent were we enabled by any means to procure an early derivation of the matter to the surface, and to make an opening for its exit; but in these deep-seated abscesses, such is the resistance opposed to their progress outwards, and such the facility with which the substance of the liver gives way to the suppurative process, that we are often surprised to find an enormous collection of matter accumulated, without any external appearance to direct us to the precise seat of it, or to guide us in making an opening for its evacuation.

With a view to obviate suppuration, and to promote the resolution of inflammation, blood-letting, both general and topical, is our chief resource; but, in addition to this, mercury has been long held to possess something like a specific influence in resolving inflammatory affections of the liver, and to its efficacy in such cases I can bear personal testimony. I am at the same time persuaded, that, from the high repute which this medicine enjoys, it has in some instances, particularly of the acute disease, been too exclusively trusted to. Practitioners seem now, however, to be generally aware, that, in patients of robust constitutions and sanguineous habits, full mercurial action is not easily induced until the tone of the system is lowered by bleeding and other evacuations. It therefore behoves us to remember, that, while bleeding in the acute hepatitis cannot be too promptly resorted to, the exhibition of mercury may be deferred, without any ultimate disadvantage. It was common, in my time, in India, to look upon blood-letting as an evacuation which it was upon all occasions desirable to avoid, but this was a sentiment in which I never permitted myself to indulge; and in the regiment in which I had the honour to serve, an opposite practice was gradually established, both in fever and hepatitis, where something peculiar in the patient's habit or circumstances did not forbid it. In hepatitis, I have frequently observed, that when doubt or

hesitation existed on the part of the practitioner, when half measures were adopted, and the early stage of the disease thereby neglected, it became extremely difficult of cure, apt to degenerate into a chronic form and to become a troublesome companion for life. Under the apprehension of such a result, I have employed blood-letting to a larger extent than what the state of the pulse, the height of the symptoms, or the habit of the patient would seem to demand, and of such practice I have never had occasion to repent. I do not, however, mean to allege, that bleeding will altogether supersede the necessity of mercury, but that in the acute form these should at least go hand in hand, and that the latter should be pushed to the extent of producing ptyalism with the least possible delay. In the chronic form of the disease, it is to mercury we must chiefly trust for the re-establishment of a healthy action in the liver, and the restoration of healthy secretions. The relief experienced, in many cases of chronic hepatitis so soon as the mercury affects the mouth, is truly surprising; the removal of all uneasy feelings from the side, the comparative clearness of the patient's skin and visage, the return of natural evacuations, and the removal of every complaint but debility, abundantly evince the powers of this remedy.

In either form of hepatitis, smart and habitual purging will materially promote the objects we have in view; and, in this instance, the preference so generally given to calomel in India, is, I believe, well founded. A few grains of this preparation over night, with a solution of some of the neutral salts in the following morning, is what I was in the habit of employing; and when by these means copious evacuations are procured, they seldom fail of producing beneficial effects, relieving the indescribable sense of tension, stuffing, and oppression about the region of the liver, and making the patient feel comparatively light, easy, and cheerful, so that we have seldom any difficulty in persuading him to repeat them as often as they become necessary. Leeches, blisters, and setons, are all well known and highly useful auxiliaries in the treatment of liver complaints; but upon the virtues of these it is unnecessary, and in this outline impossible to enlarge.

BERIBERI AND BURNING IN THE FEET.

Amongst the diseases prevalent on foreign stations, I am induced to notice "Beriberi," and "Burning in the Feet," from the formidable extent to which these have prevailed of late years amongst the troops in India, particularly amongst the native soldiery. For my knowledge of this subject, I am chiefly, indeed almost exclusively, indebted to two valuable essays on these subjects, written by Mr. Malcolmson of the Madras Medical Establishment, and which obtained the prizes offered in the following advertisement, published at Fort St. George in 1832 :—

"With a view to aid the advancement of medical science, and to communicate useful medical knowledge, the Medical Board, under the sanction of Government, announce to the medical officers under this Presidency, whether of his Majesty's or the Honourable Company's service, that a prize of Rupees 500, or a gold medal of that value, with a suitable inscription, will be awarded, in the course of the year 1833, to the best dissertation on each of the two following subjects :—

"1st, On the disease called 'Beriberi.'

"2d, On Rheumatism and the neuralgic affection, occasionally a sequela of it, which is termed among natives 'Burning in the feet.'

"Berberi being known to be endemic in certain parts of this country, and having hitherto been but imperfectly discussed by European authors, the practice of the more intelligent native doctors deserves to be deliberately investigated; and two native remedies, in particular, which have been frequently prescribed with advantage in this disease, and are known in the Northern Division, by the names 'Treeak Farook' and 'Oleum Nigrum,' should be made the subject of examination and report. The same observation, as to the expediency of inquiring into the treatment adopted by native practitioners, is equally applicable to 'Burning in the feet.'"

Mr. Malcolmson's prize essays were subsequently printed by authority of the Government at Madras, under the superintendence of the Medical Board of that Presidency, to the liberality and kind attention of which body I feel deeply in-

debted for copies of these essays, and of the other valuable documents printed under their direction.

Beriberi would appear to be a disease, in many respects, of a most anomalous description. I had long been induced, in consequence of the view taken of this disease by my friend Dr. C. Rogers, to look upon it as a dropsical affection, particularly of the chest; but although urgent symptoms are often present in this region, yet it would appear that the disease is by no means concentrated in this cavity. Mr. Malcolmson endeavours to establish the proposition that "the spinal cord is primarily disordered, and that through actions induced by the affections of its nerves, the other organs suffer secondarily," and he then goes on to dwell in succession on the paralytic symptoms, the state of the urine, the dropsical symptoms, the cardiac and other thoracic symptoms, the affection of the larynx, and the abdominal symptoms. It would appear also from Mr. Malcolmson's remarks, that the diagnosis between beriberi and rheumatism is in some cases but imperfectly established, and he observes, that "many rheumatic complaints are in ordinary practice extremely difficult to discriminate from affections of different nerves, and that where rheumatism prevails along with a mild form of beriberi, the cases will often be of an intermediate character, the symptoms of the one running into those of the other." Scurvy is another disease with which beriberi has been assimilated in the opinion of some experienced writers, and although Mr. Malcolmson has drawn a comparison between the two diseases unfavourable to this opinion, yet the line of demarcation would seem, in some respects, difficult to establish. The disease is represented as commencing with numbness, stiffness, and sense of weight in the lower limbs, œdema of the feet and legs, spasms affecting the calves and soles of the feet, sometimes becoming general, and occasionally shooting to the chest and larynx, obstructing respiration and speech. There is sometimes pain along the spine, particularly at the last lumbar vertebræ; the numbness extends upwards towards the abdomen, and ultimately to the thorax, with oppression at the præcordia, dyspnœa, diffused and irregular pulsation in the cardiac region, with puffiness of the face and hands. "The patient is often found dead in bed, or sinks after several fainting fits

and throbbings at the heart; or the œdema rapidly increases and extends up the trunk, violent dyspnœa and inability to lie down comes on, with anxiety, cold sweats, cold extremities, rapid, feeble, or irregular pulse, urgent thirst, and partial suppression of urine. Various dyspeptic symptoms occur, the bowels are frequently costive, and the evacuations variously disordered."

In dissecting patients who have died of this disease, serous effusions, more or less extensive, into the cellular substance, as well as into the great cavities, would seem to be the more prominent appearances; and in addition to this serous effusion there often exists in the lower region of the spine, about the origin of the lumbar and sacral nerves, symptoms of congestion; and in one very remarkable case, of which the details are given by Mr. Malcolmson with an illustrative engraving, an effusion of reddish coagulable lymph had taken place on the posterior surface of the theca, at the fourth dorsal vertebra, and the same in the region of the sacrum.

A disease under the name, and bearing the more prominent characters of beriberi, has long been recognised by the medical officers serving in Ceylon, and has been occasionally observed both amongst the European and native troops; but it is chiefly since the return of the troops from Ava, after the first Burmese war, and amongst those stationed in the Northern Circars, that the disease has been prevalent and fatal. Mr. Malcolmson gives numerous returns illustrative of its prevalence in these districts, and states as the general result of two successive half-yearly returns, that out of 88 deaths amongst the native troops, 52 are undoubtedly referable to beriberi, being five-eighths of the whole mortality, and five times more than the deaths either from cholera or fever. This disease has, even from the earliest notices of it, been ascribed to the combined effects of those enervating and debilitating causes, both mental and physical, to which troops are not unfrequently subjected. The more prominent of these are unusual fatigue, exposure to the vicissitudes of the weather, particularly in moist or damp localities, and insufficient or insalubrious diet. Although the recent inquiries of Mr. Malcolmson do not go to establish a necessary connection between beriberi and the causes specified above, yet these inquiries have not enabled him to substitute others

in their room, or to establish anything but "the necessity of more accurate investigations; of full statements of every circumstance in the state of corps, and of the peculiarities of their station, season, &c., however little connection they may be supposed to have with the disease." Upon causes which are so obscure or ill defined, it would be in vain to enlarge, but it seems to me very difficult to attribute to any of these alleged causes that inflammatory or congestive state of the inferior portion of the spinal chord, in which, according to Mr. Malcolmson, this disease essentially consists. But it is with these causes, as they may be supposed to bear on the cure or prevention of the disease, that we are chiefly concerned.

In the treatment of this disease, blood-letting, mercury, purgatives, diuretics, stimulants, and counter-irritants, seem to be the principal remedies upon which dependence has latterly been placed. Of the efficacy of the former, in cases adapted to it—that is, in European constitutions more particularly—in acute cases, with great oppression about the præcordia, and a strong full pulse, there is sufficient evidence; and in such cases local bleeding from the chest, by means of leeches, or the scarificator, "might be more freely employed with safety, and a prospect of advantage." There are, however, three classes of cases not always well defined, in which we are cautioned against bleeding, as having been uniformly fatal:—"1. That in which œdema of the lungs (and probably also effusion into the chest) has taken place suddenly. 2. In that form of spasmodic dyspnœa shooting from the limbs, or otherwise connected with the muscular affections, and attended with lowness of pulse, cold extremities and prostration of strength. 3. A spasmodic, enfeebled, or obstructed action of the centre of the circulation, arising from various causes; and indicated by tendency to syncope, sense of faintness, dyspnœa coming on in paroxysms, coldness of the extremities, cold sweats, anxiety and restlessness; pulse hardly to be felt, throbbing of the heart, irregular pulsation, &c." Mercury in large doses, to the extent of affecting the mouth, is said in a few cases to have aided bleeding or other antiphlogistic measures, in subduing membranous inflammation, but that it exerts no directly salutary influence over the nervous symptoms, nor prevents the

accession or return of the visceral obstruction. Purgatives, as may be supposed, have been of the most essential service, and in this shape calomel combined with jalap has been freely employed; but the compound powder of jalap has been almost universally acknowledged to be the best. Diuretics, in various shapes—both those commonly employed by European practitioners, and others in use amongst the natives—have been freely, and as may be supposed, when œdematous affections are so conspicuous, advantageously employed. Stimulants and counter-irritants are naturally indicated and employed successfully, when much local distress exists in the thoracic or lumbar region. Two native remedies of great celebrity—the "Treeak Farook" and the "Oleum Nigrum"—appear to have been adopted latterly in the treatment of beriberi by the European practitioners, and are favourably spoken of by Mr. Malcolmson.

The disease termed "Burning in the feet," which appears to be a modification or sequel of rheumatism, is scarcely, if at all known in the armies of Europe, although it would appear from Sir James M'Grigor's account of the diseases of the Peninsular army, that cases somewhat allied to it were observed after the siege of Burgos. He observes, that "after the retreat, and as late as February 1813, rheumatism of the feet was very prevalent, particularly in the fifth division of the army. Mr. Hill, who superintended the hospitals in this division, informed me that the sick as well as the convalescents complained of distressing pains in their feet; nothing but opium and keeping their feet in warm water was found to give them relief.

This is the only notice of anything like the disease which I have met with in the British army; but of its prevalence amongst the Sepoys, some idea may be formed from the introductory part of Mr. Malcolmson's paper, in which he observes, that every fact contributed to its history is of great importance to the welfare of the Madras army, that "there is no disease, except fever, more prevalent amongst the Sepoys than rheumatism, and although not often fatal, has been stated, and probably with truth, to be the cause of more men being lost to the service than all other diseases put together."

Although rheumatism in its more ordinary forms, both

acute and chronic, is thus prevalent among the Sepoys, and has long been so, it is only since the first Burmese war that the disease termed "burning in the feet," has come into notice. This term, it would appear, has no pretensions to accuracy, and is merely to be looked upon as a translation of the ordinary expression of a native soldier for the distressing sensation, confined for the most part to the soles of the feet; in some instances "the hands have partaken of the morbid state, and in a few cases the burning has extended to the whole body, and even to the face." This, in severe or long-continued cases, is accompanied with disorder of the general health, impaired digestion, diarrhœa, dysentery, and emaciation. When these symptoms have not been of long duration, and the visceral affections are slight, the prognosis is not unfavourable, but it would appear that great precaution is necessary in recognising the disease in its earlier stages, and there is reason to believe that an ignorance of the complaint has led to the sacrifice of many lives, and the entailing of great and permanent expense on Government. "Melancholy instances," says Mr. Malcolmson, "have come to my knowledge, where men have died in making exertions above their strength, after having been looked on and treated as malingerers, and others where slow decay and uncontrollable disease have carried them off. When it has proved fatal, the morbid appearances chiefly recognised, are tubercular disease and dropsical effusions, without any morbid alteration in the seat of the pain; nor do dissections throw any certain light on the cause of the sensation—the same morbid changes having taken place when this symptom was wanting as when it was present; but they point to the lower part of the spine as the seat of the local disorder, and are of the greatest use in leading us to a correct estimation of the formidable nature of symptoms which end in extensive alterations in the structure of the viscera of all the cavities." The pathological inferences are, that the disease is not confined to one part of the body, but appears to be connected with a general depravation of the system and morbid state of the fluids. It has been found to prevail, like scurvy and beriberi, in circumstances where the troops have been placed in a forced or artificial state of existence; a foreign climate, exposure to damp, and a diet deficient in variety and nutritive properties,

would seem to be its more prominent causes; and hence, the cure is essentially to be sought for in a change of climate, and a return to the usual habits of life and food of the Sepoy, with an exemption from duty and hard drills. Antiscorbutics and mild laxatives have been recommended internally, with leeches and the usual stimulant and anodyne embrocations to relieve the local pain. Blisters are said to be hurtful in constitutions so irritable as those affected with this complaint, and have occasionally been followed by sloughing.

DRACUNCULUS, OR GUINEA WORM.

Of the several local affections which often prove a source of distress to individuals and of detriment to the service, upon foreign stations, there is perhaps none which holds a more prominent place than the troublesome affection produced by the Dracunculus or Guinea Worm. The numerous papers which have been written on this subject by medical officers in the service of Her Majesty or of the Honourable East India Company, while they show the interest which attaches to the history of this animal, and the mode of its lodgment in the human body, give also some remarkable statistical statements as to its prevalence in particular corps, at particular periods of the year, and in particular cantonments or garrisons.

In a valuable treatise on worms, published here some years ago by Mr. Rhind, following the arrangement of Rudolphi and Bremser, he gives a short account of it under the name of Filaria Medinensis, the name adopted also in the Linnæan classification. It is possible, however, that under the common designation of Guinea Worm, different varieties, if not different species, have been noticed by practical writers—a conjecture which is in some degree countenanced by the different and contradictory reports as to its mode of propagation, and the different names by which it has been designated, some of these, as Gordius lacteus, having reference to its appearance, and others, as Gordius aquaticus and Gordius argillaceous, to the

supposed *habitat* of the parent animal; the idea of different species or varieties of the worm, is also, perhaps, countenanced by the appearances of different specimens. Amongst those to be seen in the museum of the class, one is more filamentous, and another more plump and fleshy, if I may be allowed the expression; one is darker, and another lighter in colour—a difference, however, which may be dependent on circumstances connected with the extrication of the animal, or with the preparation of the specimens. After giving the generic and specific characters from Rudolphi, Mr. Rhind gives the following description of the animal, accompanied with a figure. "It is of a white colour, of the size of a violin string, and of equal thickness at both ends and throughout its length, except, perhaps, that it tapers slightly towards the tail, which is a little bent. Its head has a small trunk called a beard by the Persians, and which, when examined by a microscope, seems to be furnished with small hairs. Some think they have discovered a head at both ends; while Bremser is of opinion that the inferior end may be furnished with generative organs." Various statements, some of them apparently very extravagant, have been made as to the length which this animal attains. Dubois, a learned missionary in India, and trustworthy person, states that he saw one a yard long; but the more common length, as stated by Dr. Bird in the "Transactions of the Medical and Physical Society of Bombay," varies from six inches to two feet.

The possibility that the animal thus described may prove to be one of those entozoa which have of late so much attracted the attention of naturalists, has been hinted at, but there are, in my opinion, strong arguments against this supposition, and after a conversation with my colleague Mr. Goodsir, the professor of anatomy in this University, who is well known to the scientific world as an eminent naturalist, I do not look upon this as even a probable conjecture. As to the introduction of the animal into the system, Dr. Chisholm, in a very learned and interesting paper upon the subject, to be found in the eleventh volume of the Edinburgh Medical Journal, contends strongly in favour of the opinion that the ova are contained in the water of certain wells, dug in volcanic soils contiguous to the sea, and thus introduced into the stomach; whence, if I understand

this theory of its propagation, the ova are conveyed along with the chyle into the circulation, and ultimately deposited by the secreting vessels in the cellular membrane. In support of his views, Dr. Chisholm refers to an amount of experience which has fallen to the lot of few others, having had under his charge, within a period of three years, nearly 3000 cases of Guinea Worm; and he gives some very remarkable statements of the rapid diminution, or indeed complete disappearance, of the complaint amongst the negroes on certain estates in Grenada, when rain water, collected in reservoirs, had been substituted for the water of the wells formerly used. While the learning, talent, and experience of the late Dr. Chisholm entitle any opinion of his to be treated with respect, there seems to me to be many insurmountable objections to his theory of the development of the animal, and of these one of the most forcible is the circumstance of its being so generally evolved in a particular locality—in the inferior extremities. Its appearance in this region of the body is much more easily explained on the supposition that, the animal being viviporous, the young, in a very minute state, insinuates itself under the skin. In confirmation of this view I may add that Dr. Cobbold, the Assistant Conservator of the Anatomical Museum in our University, has detected in the oviduct of an adult specimen from my collection, myriads of minute and perfectly developed dracunculi. They can be very well seen with an half inch object glass, but their structure is best exhibited if the magnifying power be increased to 250 diameters linear.

This view of the subject seems also to explain most satisfactorily the frequent appearance of the animal in the inferior extremities, which amongst the inhabitants of India, both natives and Europeans, are very generally exposed naked, and often immersed in water or in mud. It best explains also the prevalence of the animals in particular districts of the country, supposing that, like certain plants, it clings to particular *habitats*. It explains also its periodical occurrence as an epidemic amongst the troops in certain districts or in particular cantonments. In Grenada it was observed to be most prevalent in November, December, January, and February. In Bengal I am not aware of its being very generally prevalent,

or noticed to occur in connection with any of the periodical changes of the seasons; but in the Madras Presidency the months of December, January, and February, are those in which its prevalence has been most remarkable. In Bombay, again, where, of all our foreign possessions, it has been most prejudicial to the European soldiery, the periodical appearance of Guinea worm has been, for the most part, in the monsoon months, or those of June, July, August, and September. During one monsoon no fewer than 200 cases occurred in the 86th regiment at Bombay, and from the medical officers of the Indian army we have numerous interesting papers on the subject in the Calcutta and Bombay Transactions, from Drs. Smyttan, Kennedy, Bird, Morehead, and others. The former had an opportunity of seeing numerous cases amongst the men of the European and native artillery at Matonga, near Bombay, a station notorious for its periodical occurrence and extensive ravages, and this, indeed, to such a degree as to have been assigned as one of the principal reasons for abandoning this fine cantonment, with its expensive barracks, and other buildings.

Dr. Morehead, author of one of the most recent of those papers to which I allude, had an opportunity of seeing numerous cases of Guinea worm in the hospital of the 4th Light Dragoons, at Kirkee, where not less than 211 cases occurred in one season, 1832. While this gentleman hesitates, in the present state of our knowledge, to offer any opinion as to the propagation of the animal, he very properly dwells upon "the propriety of noting every circumstance which can possibly be supposed to bear relation to the subject—such as the geological structure of the affected site, the nature of the soil, the nature of the wells, the rock in which sunk, the abundance or scarcity of water, the seasons of increase and decrease of the disease, the opinions of natives," &c. Dr. Morehead conceives that he can recognise a feature common to all the localities in which dracunculus prevails, and that all the localities are in districts, the rocks of which are of the secondary trap series. This opinion or conjecture is supported by his personal observation, so far as it goes, and he refers to the prevalence of the complaint in numerous villages of the Deccan and Northern Concan, which countenances the idea; while, at the same

time, he candidly admits the necessity of farther investigation—observing, that "it is absolutely impossible to form any idea of how nearly, by such researches, we might approach the subject, and within what narrow limits bind its discussion."

With reference to the occurrence of cases at particular stations, it is necessary to advert to a very remarkable feature in the history of the animal, its period of incubation, or its development at very distant periods after its supposed reception into the system. At Matonga, where Dr. Smyttan had ample opportunities of observation amongst the men of the artillery, he says:—"I was soon led to remark, during the prevalence of Guinea worm, that the recruits did not suffer like the other men; and, after the most careful observation, I think I may now safely assert that the Guinea worm never appears in men previous to their second season of residence. A complete season appears requisite to render them susceptible, or rather to mature the animal for the process of extrication." Several cases which occurred on board the Cirencester Indiaman, under Mr. Paton's observation, developed themselves between the 30th of May and 9th of August, while "the foundation of the disease must certainly have been laid in the preceding July and August, when the ship lay in Bombay Harbour." Other instances have occurred of its appearance in ships at sea; and from Sir James M'Grigor's very interesting notice of this affection, we find that, in the 88th Regiment, of which Sir James was formerly surgeon, the disease developed itself rapidly on board the Minerva transport, on her passage from Ceylon to Bombay—103 cases occurring in one month, and 160 being under treatment at one time. This led him to the opinion of its being propagated by contagion, and the possibility of its being propagated in this way is also admitted by the late Mr. Bruce, formerly of the 88th; but from what is stated by Dr. Smyttan, and by several other writers, as to the period requisite for the evolution of the Guinea worm, it is obvious that the occurrences on board the Minerva may be explained without the supposition of contagion, and are indeed inconsistent with it. The specimens in the museum afford two remarkable examples of the extrication of this animal—not indeed during, but after, the completion of a long sea

voyage, and at a distance from the scene of their supposed origin. One of these was taken from the leg of a soldier of the 65th Regiment in Edinburgh Castle, after his return from Bombay; and others were taken from the legs of soldiers of the 4th Dragoons after their return from the same Presidency, and when quartered in the barracks at Canterbury.

It is chiefly in the inferior extremities, as already noticed, that the morbid appearances occasioned by the Guinea worm are observed, and of these appearances I have a minute account from Mr. Graham, a surgeon in the Bombay army, to whom I am also indebted for a specimen taken from his own leg. The patient's attention is first attracted by a sense of itching, and this continuing to annoy him he is led to examine the part, when a small pimple or vesicle is for the most part observed. Contiguous to this, in some cases, the filamentous worm is to be felt imbedded in the cellular membrane, convoluted like a piece of twine or whip cord under the skin; occasionally the extremity of the animal is to be seen protruding from the orifice left by the rupture of the vesicle, and in some favourable cases the whole animal is extricated without any considerable irritation, the patient following his usual avocations, or, if a soldier, continuing at his duty. More frequently, however, the extrusion of the worm, whether accomplished by the efforts of nature or favoured by art, is accompanied with pain and inflammation, of an erysipelatous or phlegmonoid character, followed by tedious suppurations, contractions of the tendons, diseased joints, and even gangrene; much of this depending in all cases upon the natural constitution of the individual, or his state of general health at the time.

In the foregoing observations I have occupied myself chiefly with the question of the means by which the Guinea worm is propagated, and the formidable consequences with which it is occasionally attended, feeling that there is no instance in which preventative measures are more decidedly superior to curative measures than in this, "sublata causa tollitur morbus." I feel at the same time, that my personal experience in this affection is not sufficient to enable me to enlarge upon the treatment. We had several cases of Guinea worm amongst the men of the 2d battalion of the Royals at Bellary, in the Ceded districts.

in 1813; and here our practice was confined to the two obvious indications of removing the worm and circumscribing the inflammatory affection connected with its development or extrication. The former was attempted, and generally accomplished by winding the worm round a small bit of bougie, or some such substance, in the way recommended by several practical writers on the subject. Another mode of its removal is, by making an incision, as nearly as can be ascertained, over the central part of the animal, and inserting a small hook, or wire, or a thread under the worm, so as to draw it out double. This mode of operating is minutely described by the late Dr. Alexander Kennedy in an appendix to Mr. Scott's paper on the Dracunculus, in the seventeenth volume of the Edinburgh Medical Journal. It is said to be practised very adroitly by the natives in several parts of India, and particularly by the barbers, whose claims to dexterity have so often come in competition with those of the surgeon.

In the cases which fell under my own observation at Bellary, the inflammation surrounding the site of the worm was treated in a few instances by poultices, and in others by cold saturnine lotions. In the paper above alluded to, by my friend Mr. William Scott, formerly of the Madras army, we have some of the most judicious remarks on the nature, propagation, and treatment of the Guinea worm with which I am acquainted; and this gentleman restricts the applications which may be used advantageously to "poultices of argillaceous soil, or the black ooze of brackish soils," and particularly recommends the liberal use of cold water, either by immersion or by subjecting the affected limb to a douche or continued stream. In this way the impetus of the douche may possibly operate beneficially by exercising some slight degree of traction upon the protruding or pendulous part of the worm, and thus favouring its extrication, as well as by controlling the inflammation by the cold. Mr. Scott very properly deprecates the employment of irritating or "noxious matters in the view of killing the animal," for which purpose cataplasms of aloes, assafœtida, and garlic, have been recommended. Of the bad effects of the last we have an example given by Dr. R. H. Kennedy of the Bombay army in the case of a young lady,

withdrawn from under his care by a "resolution of the female divan," and consigned to the care of the hackeem or native physician. Of the employment of internal remedies, such as the administration of mercury, I forbear saying anything. They are altogether uncalled for; and it would, in my opinion, be paying them too high a compliment merely to say that they were useless.

FEIGNED AND FACTITIOUS DISEASES.

Various motives have induced individuals to simulate the appearance of disease, and of these one of the most common is the hope of evading military service. The great amelioration in the condition of the soldier and seaman, which has taken place under an enlightened government, has indeed rendered attempts at this species of deception less frequent than formerly; still there are to be found, both in the military and naval branches of the service, some worthless characters, who, instead of showing a commendable zeal in the discharge of their duty, are incessant in their attempts to impose upon the surgeon; and whenever they succeed in exempting themselves from duty, they throw an additional burden on the willing and meritorious soldier, while at the same time every successful case of imposition becomes a focus, whence other similar attempts emanate. This subject, therefore, possesses, in a national point of view, a much deeper interest than might at first be supposed; as it regards the efficiency of men for the public service, the protection of the real and innocent sufferer from suspicion, and the exemption of the good soldier from an undue proportion of duty.

It is only of late years, indeed I may say since the termination of the war with France, that the subject of feigned and factitious diseases has assumed any prominent part in the writings of medical officers, or of others. We have now, however, in the works of Marshall, Hennen, Hutchison, Cheyne, and in an article in the Cyclopædia of Practical Medicine, many interesting and instructive cases recorded, and many

glaring impostures exposed. In 1835, a prize was offered to the students of Military Surgery in this University, for the best essay "On the Classification of the Feigned and Factitious Diseases of Soldiers and Seamen, the means used to simulate or produce them, and the best means of detecting Imposters." After a careful examination of the several essays sent in upon that occasion, by myself, by some of my colleagues in the medical faculty, and by some of the medical officers then stationed in Edinburgh, the prize was assigned to the late Dr. Gavin, who subsequently published his essay in an extended form. This essay, I am glad to observe, met with the approbation and patronage of the several distinguished officers presiding over the medical departments of the Army, the Navy, the Ordnance, and the Honourable East India Company's Service. While Dr. Gavin completely met my own views and wishes as to the literature of the subject, and the practical information to be derived from the various sources which he so thoroughly investigated, he, in some degree, misconceived my object as to the classification of these diseases.

In looking to the disabilities which entitle soldiers and seamen to discharges and to pensions, it is obvious that many of them cannot possibly be feigned; that others cannot be feigned without the most consummate art and perseverance; and that others may be feigned or induced with comparative facility. There is a wide difference between the case of one man whose complaint is obvious, its reality unquestionable, and its cure impossible, and the case of another whose disability is perhaps imperceptible, its existence doubtful, and its cure even probable. And between these two extremes there are a variety of cases which might possibly admit of a classification calculated to assist the surgeon in the discharge of a most important and onerous duty; but I can contemplate no classification which would absolve him from the necessity of the most guarded circumspection in all cases, which would enable him to avoid the chance of individual hardship or injustice, and which would remove from his shoulders that load of professional responsibility which he lies under, to the public on the one hand, and to the disabled and deserving soldier on the other.

The extent of malingering varies greatly at different

periods of our military history. Mr. Marshall observes, "there is a much greater proportion of malingerers in some regiments than in others, a difference which may, perhaps, in part depend upon the discipline of a corps, the conduct and general demeanour of soldiers being greatly influenced by the nature of the discipline under which they are controlled. But with regard to the simulators of disease or disabilities, I am disposed to think that they never became numerous in a regiment, when the surgeon possesses experience, and that peculiar tact which enables him not only to detect malingerers, but so to adapt the means to the end as to induce them to give in. Soldiers soon form an opinion of the ability of their medical attendant in this respect, and seldom attempt to deceive, unless they think their artifice will succeed. This tact does not depend upon severity; for the most efficient surgeon will often doubt, without expressing his suspicions, and seem to be the dupe of a schemer, that he may become his master."

The medical officer intrusted with the examination of military men claiming leave of absence, exemption from duty, or pecuniary rewards for their sufferings, must be constantly on his guard against imposition, or the exaggeration of accidental and trifling symptoms and appearances. He ought at the same time to be careful not to push his incredulity too far. Of this a melancholy instance, and by no means a singular one, is recorded by Dr. Johnson in the fourth volume of the Medico-Chirurgical Review, in which a seaman, who complained of disease of the shoulder-joint, was punished for skulking, when it afterwards turned out that a deep-seated abscess had been forming, which ultimately terminated in anchylosis.

It is in general hospitals, when soldiers are separated from the surgeons of their own corps, that impositions are most frequently attempted, and whenever the suspicions of a medical man are excited, he should endeavour to conceal them. He should himself become a dissembler; for while the impostor is persuaded that the medical attendant is his dupe, he will be less on his guard, and if judiciously questioned as to the circumstances, the origin, progress, duration, seat, and intensity of his malady, the effects of remedies, &c., he will seldom be able to tell a consistent tale, but will betray some incongruity

in his statements, which will enable us to elicit the truth. "It is generally, however, good policy to afford a malingerer an opportunity of retreating, or, to use the language of the military hospital, to *let him down softly*."

The diseases assumed by malingerers, or "hospital birds," as they are technically termed in the service, are various, according as they are assumed for temporary or for permanent purposes—for the purpose of admission into the sick list, or of procuring their discharge from the service. The persevering obstinacy of some impostors, and the extreme simplicity of others, are equally remarkable, and in some instances equally ludicrous. Of the first, a singular example, which I well recollect, was presented in a case mentioned by Mr. Marshall, that of Fitzgerald, a soldier of the Royals, who, in consequence of an alleged injury in his back, pretended to be unable to stand upright, and, in spite of much rough treatment, kept his body bent forward day and night for a period of eighteen months, so that when his arms were allowed to hang down, the fingers reached to within a few inches of the ground. His period of service being expired, and seeing no prospect of obtaining a pension, while a bounty of sixteen guineas was the premium for re-enlistment, this individual recovered in two days; but "moral turpitude, not physical disability," prevented his being re-admitted into the Royals.

Of the extreme simplicity of another dissembler, I recollect a ludicrous instance in the case of a man rather advanced in life, who had been enlisted at an out-station, had been regularly passed by an experienced surgeon, and duly attested; but before joining the regiment, having begun to repent of his engagement, he stated to me that he was liable to rupture. Upon the most minute examination, I could find no trace of hernia, and gave my opinion accordingly. The recruit then very gravely told me that his rupture was of that peculiar kind that it always went up under fatigue, and that the exertion of marching up to the head-quarters of the regiment had made it disappear. I immediately told him that this was a very singular species of rupture, but of all kinds the most convenient for a soldier, that we could contrive to give him plenty of fatigue, and that, at all events, we should keep him until the rupture again made its appearance. The man went to his duty, and the rupture was never more heard of.

The distinction between feigned and factitious diseases will readily be understood; but without adhering rigidly to this distinction, or to the classification formerly hinted at, I shall offer, in succession, a few observations on these diseases as they affect the system at large, the brain and nervous system, the thoracic and abdominal viscera, and the extremities. In lecturing upon this subject I am in the habit of teaching chiefly by examples, giving, in addition to the cases which have fallen under my own observation, a selection from those contained in the writings formerly referred to. At present I shall content myself with a few general remarks on the most common impostures practised by soldiers and seamen, the characteristic distinctions between real and feigned diseases, the means by which artificial diseases are frequently produced, and the best means of counteracting imposition.

A Paroxysm of Fever is one of the acute forms of disease most commonly simulated, and in the history and symptoms of an intermittent, some old soldiers are profoundly versed, skilfully imitating its rigours, but, in general, overacting their parts, increasing their efforts to deceive, as the surgeon's suspicions seem to be awakened. The febrile paroxysm consequent on intoxication has sometimes been the means of cloaking the offence, and of screening the offender from punishment; while it has subsequently become the source of much mirth at the expense of the surgeon who has been deceived by it. A paroxysm of fever is said to be excited by the introduction of a clove of garlic into the rectum, and the white tongue, characteristic of this disease, has been imitated by rubbing it with chalk. In one remarkable case narrated by Mr. Copland Hutchison, the tongue was loaded one-eighth of an inch thick by a coating of common brown soap—a clumsy expedient, which was readily detected. The pallor and cadaverous aspect incident to some stages of fever, and to protracted disease in general, are said to be imitated by exposure of the face to the fumes of sulphur, and by drinking an infusion, or smoking the seeds of cummin—an effect of this substance, which is mentioned by several ancient authors—Persius, Horace, Dioscorides, and Pliny—who state that the scholars of Portius Latro, a celebrated professor of eloquence, took this way of imitating the colour which hard study had given to

the complexion of their master. The effect of all these substances, however, is of course temporary, and will cease soon after the cause is withdrawn.

Amongst Mental diseases, those most commonly simulated are the extreme cases of furious mania, and intellectual weakness or drivelling idiocy; but in none of these cases is it easy for an impostor to keep up that continued attention to appearances which is necessary for his purpose. Besides the difficulty of sustaining for a length of time, the mental phenomena of insanity, there are often present, particularly at the commencement of a genuine maniacal attack, certain physical peculiarities which it is scarcely possible to feign. Amongst these, long continued abstinence, incessant watchfulness or want of sleep, an immoderate muscular power, and non-obedience to the usual effects of medicine, are amongst the most remarkable. It is to be observed, also, that the real disease is often slow in its advances, and that on looking backwards, various circumstances will be recollected in the conduct of a patient, which lead to the conclusion that his mind has been, perhaps for months previously, in a state of occasional aberration; while in cases of feigned mania the paroxysm comes on without any premonitory symptom, and often under circumstances where the object of it can be distinctly seen. These last observations apply equally to cases of assumed idiocy or mental weakness, which, in the case of a clever and persevering impostor it is extremely difficult to detect—most men having enjoyed "opportunities of studying the character in the instance of the poor idiot still to be met with at large in almost every village." Solitary confinement, spare diet, bleeding, and repeated blisters or counter-irritants, are amongst the most appropriate remedies in real mania, and are not very tolerable to an impostor. It has been well observed, that "seclusion is particularly necessary in all such cases, as nothing tends so much to keep alive the hopes and the courage of the impostor as the consciousness that his raving is heard by his fellows, and the belief that an impression favourable to his views may be made on the minds of his officers by the continued exhibition of his miserable state."

Epilepsy is perhaps one of the diseases most frequently and successfully feigned. The intermittent character of this affec-

tion obviates the necessity of that continued simulation which is necessary in cases of mania and idiocy. In cases where this disease is assumed, either amongst the soldiery or in civil life, the times and places of attack are naturally selected, so that the paroxysm may not pass unobserved by those upon whom it is desirable to make an impression. The impostor frequently here, as in other cases, overacts his part, and by the excess of his contortions, throws himself into a profuse perspiration; the discharge of blood and saliva from the mouth has been occasionally produced by biting the tongue, pricking the gums, and chewing a piece of soap; but the fictitious epileptic is unable to produce the bloated and distorted countenance, and to exert the convulsive muscular power characteristic of the real disease, or to resist the usual effects of stimuli applied to the eyes, the nostrils, or the skin. While in the real epileptic the pupils remain fixed and insensible to the action of light, they are, in assumed cases, obedient to this stimulus; and individuals have been roused from a feigned paroxysm of epilepsy by dropping into the eye a few drops of alcohol, or any acrid liquid; by blowing into the nostrils some pungent snuff; by suddenly dashing a bucket of cold water over their bodies; or by applying to the skin a spatula or piece of cloth dipped in boiling water. Fictitious epileptics have also occasionally betrayed themselves by opening their eyes, evidently for the purpose of observing the effects of their gesticulations on the bystanders; or by adopting certain suggestions as to the nature of real epileptic fits, which have been purposely thrown out, in their hearing, by expert and intelligent surgeons, with a view to mislead them.

Partial convulsive affections, if feigned, are for the most part readily exposed by protracted watching, it being impossible for the impostor to keep up an incessant muscular action without exhausting himself; and when it is pretended that such affections come on periodically, the suspected person should be placed, as if accidentally, in a situation where he can be overlooked without his being at all aware that he is under observation; in such a situation he will not continue the semblance of disease when he can expect no impression to be made even by the reality.

Paralytic affections, it may be observed, unless dependent

upon some obvious organic lesion, are but little incident to men at that time of life when they are usually called upon to serve as soldiers or seamen. The general appearance of paralytic limbs is well known; and when this disease has been feigned, impostors have occasionally been detected by the application of strong and unusual stimuli, particularly the electric shock, or by approaching the individual cautiously during sleep, and tickling him in such a way as will induce him to move the pretended paralytic limb.

Ophthalmia.—The artificial production of this disease has already been noticed, and of the extent to which this has upon some occasions been carried, in the army, an estimate may be formed from the following statement:—"In the year 1809, three hundred of the men of two regiments which were on duty at Chelmsford, became affected with ophthalmia. The healthy men of the corps were removed to another station, and the sick remained in hospital, but under military command. Information having reached their commanding officer that one of the nurses of the hospital was in the habit of going to a druggist's shop for the purpose of purchasing medicines, suspicions were excited; and in conjunction with the medical officer in charge of the hospital, he made a successful attempt to discover whether the men had any drugs in their possession which might be employed to excite inflammation of the eyes. Accommodation having been provided for about twenty-four men, the number contained in one ward, at midnight the officer made his appearance in the hospital; the men were roused from their beds, and forthwith marched in a state of nudity to the new ward. The old ward was secured for the night; and next day, when the beds were examined, a number of small parcels of corrosive sublimate were found concealed. Means were taken to prevent a supply of this article, and in a very short time two hundred and fifty of the men had recovered, and were then marched to their respective corps."

The substances used for producing artificial ophthalmia are, it is believed, very numerous. Amongst others to which the patients have, for the most part, ready access, are lime, snuff, the juice and ashes of tobacco, &c. Amongst the more prominent of the circumstances leading to a suspicion of the factitious nature of the disease, is the suddenness of its invasion,

and the rapidity of its progress; its confinement almost exclusively to the privates or non-commissioned officers of a regiment, without affecting the officers, women, or children; the circumstance of its being very frequently confined to one eye, and that almost always the right.

The most effectual means of counteracting attempts to injure the eyes by the application of noxious substances, are the seclusion of suspected individuals; the employment of handcuffs, or the use of tin masks for the face, so contrived as to prevent the patient's access to his eyes. Of this last-mentioned contrivance, which has been used with success, I am in possession of a pattern made for me under the direction of Mr. Marshall, formerly assistant surgeon of the 87th regiment. But perhaps the most efficient check to the future propagation of artificial ophthalmia will be the following paragraph of the Pensioning Warrant issued in 1829:—"Whenever a case of total or partial blindness shall be involved in so much doubt, as to have been reported to a court-martial by a medical officer to be '*a suspicious case*,' the commissioners shall deal with it as to them may seem most just; but in every case in which it is proved that a soldier has tampered with his eyes, or that his loss of sight has been caused by vice, intemperance, or other misconduct, and that his character is bad, instead of being discharged on a pension, he shall be detained in an *eye infirmary*, or shall be sent home to his parish, or dismissed without a pension."

Palpitation of the heart, and inordinate action of the arterial system, are excited by means some of which are not well understood; but a very interesting account is given by Mr. Hutchison of an epidemic of this kind which prevailed amongst the men of the Marine Artillery, and was discovered to have been produced by the use of Hellebore.

Hæmoptysis has been frequently assumed as a counterfeit disease, and besides the very obvious practice of pricking or cutting the gums and contiguous parts, for the purpose of tinging the saliva with blood, it is said to have been artificially coloured with various pigments. In a case detailed to me by Mr. Guthrie, and subsequently noticed in his work on the arteries, a soldier resorted to the very desperate expedient of swallowing a piece of cork stuck full of pins, which in the first

instance produced copious hæmoptysis or hæmatemesis, and ultimately death by wounding the carotid artery. The most obvious circumstances demanding attention in suspicious cases are the character of the sputa, the presence or absence of fever, and the usual characteristics of real hæmoptysis, with a rigid and frequent examination of the patient's mouth.

Dysentery and Diarrhœa.—Wherever these diseases are prevalent in an army, we have individuals occasionally assuming them for the purpose of evading duty. The symptoms are readily learned from patients actually labouring under them, and dysenteric evacuations are not unfrequently borrowed for the purpose of deception. Mucous evacuations are said to be occasionally produced by introducing suppositories of soap, or of more acrid matters into the rectum, and blood is sometimes artificially mixed with the stools. Bowel complaints are stated by Mr. Hutchison to have been artificially produced amongst the seamen by the employment of vinegar and burnt cork; the rationale of this process I am not able to explain, but I may remark that all feigned bowel-complaints are for the most part easily detected by secluding the suspected individual, debarring him from access to the means of carrying on the imposture, and compelling him to use a close stool, so as to be satisfied about the nature of his evacuations.

Incontinence of Urine has been very frequently feigned by soldiers and seamen. It is stated to have been a very frequent complaint amongst the French conscripts during the wars of Napoleon, and upon some occasions it has appeared like an epidemic in our own service, as in the instance of a militia regiment mentioned by Dr. Cheyne. Whenever numbers come at once to be affected in this way, the disease may almost with certainty be considered as feigned, as it can never prevail epidemically amongst men at that time of life, and with those habits and constitutions for which soldiers and seamen are selected. It has been detected by carefully watching a patient, and observing him make a muscular effort for the expulsion of the urine, and by the administration of an opiate, which will not suspend the real disease, but will produce its natural effect upon the impostor, throw him into a sleep, and thus interrupt his voluntary efforts to expel the

urine. Fictitious cases have been successfully treated by prescribing a few lashes on the loins, with the avowed object of strengthening the parts, and by the administration of a cold bath morning and evening; but perhaps the most humane, and at the same time the most efficient means of checking an artificial complaint of this kind is the practice followed in the Austrian army, of furnishing a patient complaining of enuresis with a urinal, and compelling him to do his duty.

Hernia.—Attempts have not unfrequently been made to simulate the appearance of hernia, or sarcocele, chiefly by means of inflating the cellular substance of the scrotum; and a paper, containing the following "receipt for making a rupture," was picked up in a ward of the King's Infirmary in Dublin, which had been recently vacated by a soldier, who subsequently availed himself of the directions it contained:— "To puncture the bag with a corking-pin, and then, by means of a piece of tobacco-pipe, to blow it up with air; and if it were wished to produce a double rupture, the same thing was to be done to the other side; after which warm poultices were to be applied, to take down the inflammation." This is an imposition, however, which can scarcely deceive a surgeon whose attention is in any degree excited to the subject.

Rheumatism.—The acute form of this disease cannot be easily simulated, and in its more chronic form it cannot exist long without wasting the limb and impairing the health. The impostor who feigns this disease gives, for the most part, an exaggerated picture of his sufferings, beyond what seems ever to be experienced in the genuine disease. He is also given to complain at all seasons, and acknowledges no benefit from any remedial measures that may be adopted, while in the real disease relief is experienced from the remedies usually employed, or from a more genial season. I have been informed of the case of a rheumatic soldier, who was exposed by the very simple expedient of transferring him during sleep to the opposite side of the door, in consequence of which he mistook the lame leg. As to treatment, it may be remarked, that the practice most beneficial in the real disease, as repeated blistering and counter-irritants, becomes eventually intolerable to the impostor, and that rheumatism is often benefited by exercise, and is not therefore always a cause of exemption

from duty. No man ought to be discharged for alleged rheumatism until some organic change has taken place, and until he has undergone a series of local applications, cupping, leeches, blisters, and issues, which will indelibly mark him as an unfit person to be again taken into the service.

Contractions of the Joints are not unfrequently feigned, and often difficult to detect. If persevered in for a long time they become real, and are attended with wasting and permanent lameness. The most obvious means of detecting an impostor are, to take him by surprise, engaging his attention by some conversation in which he is interested, and then suddenly moving his limb; to employ a tourniquet or tight bandage, so as to suspend the action of the muscles, and then trying to move the joint; to suspend the muscular power by the operation of an emetic; or perhaps by intoxication. In exposing impositions of this kind, and some others, the chloroform appears to me likely to be used with great advantage; and in illustration of this, I would advert to the following case:— A patient without, I believe, any intention to deceive, had long been disabled from a rigid stiffness of the elbow-joint; and the arm being in the extended state, it was not only useless but cumbersome. After a consultation of several experienced surgeons, the excision of the elbow-joint was resolved upon with a view of restoring the flexibility of the arm; and the patient having agreed to this, was placed upon the operation table. Before proceeding with the necessary incisions, the patient was brought completely under the influence of chloroform, and without rousing him from his anæsthetic sleep, the arm, to our great surprise, was with some little difficulty brought into a state of semiflexion, and the operation consequently abandoned.

Ulcers are occasionally produced artificially, and more frequently aggravated by the application of various irritating substances, as quicklime, acids, various salts, copper coins, &c. In two cases furnished to me by Mr. Cockburn, the agent for sick and wounded seamen at this station, the impression of the naval button was to be seen upon the sores, the anchor and cable most distinctly marked. In cases where artificial interference was suspected with ulcerated legs, the practice of sealing or marking the bandage so as to prevent its being

undone without detection, has long been in use; but this is not sufficient to prevent individuals from irritating their ulcers by blows on the part, or by means of pins thrust through the bandages; the more effectual plan, therefore, is to enclose the leg, after being dressed, in a box or wooden boot, such as was used by Mr. Hutchison in the naval hospital at Deal, and one of which he was good enough to transmit to me for the purpose of being exhibited to the students of military surgery.

Maiming or self-mutilation has been occasionally practised in all armies from very remote times. One form of it practised amongst the Romans in the latter days of the empire, was the cutting off a thumb, and hence is said to be the derivation of our word poltroon, "pollex truncatus." Maiming is occasionally practised openly and avowedly, with the view of disabling the individual from the service; and of the daring hardihood and desperation with which it is sometimes resorted to, I recollect a remarkable instance in the case of a soldier, who discharged the contents of his musket through his wrist, for the avowed purpose of obtaining his discharge and being sent home from a distant foreign station on which he was serving. I found it necessary to amputate this man's hand, and was no sooner done, than he held out the other hand, saying, that if I would give him a glass of grog, I might take it off also. He was subsequently tried by a general court-martial, and, instead of being sent home, was sentenced to corporal punishment, and afterwards to be degraded and employed in sweeping the barracks. His object being thus frustrated, he went immediately and drowned himself.

Mutilation has, however, been more frequently practised in a secret way, the object of the soldier being to get rid of the service, and at the same time to secure a pension. In judging of such cases, a medical officer will naturally be guided by a consideration of the nature, site, and extent of the wound, its correspondence with the alleged cause, and other collateral circumstances. An effectual provision against future acts of mutilation in our service, will probably be found in the 26th and 27th clauses of the pensioning warrant formerly referred to, by which it is provided, "that every soldier maimed by the firing off of his musket, or by other means, and who there-

by becomes unfit for service, whether the injury occurred on or off duty, whether accidentally or intentionally, shall in all cases be tried by a district court-martial, as soon after the event as possible. The soldier's claim to discharge or to pension, and even his exemption from punishment, depends on the decision of the court.

The difficulty of forming a correct judgment in such cases may be estimated by the following occurrence in the French army after the battles of Lutzen and Bautzen, in which it appears that 2632 soldiers were slightly wounded in the hands. Suspicions having arisen that the wounds were voluntarily inflicted, a board of medical officers, at the head of which was Baron Larrey, was assembled by order of Napoleon, to investigate the circumstances attending these wounds; but after mature inquiry and deliberation, the board came to the conclusion, that it was not always possible to distinguish between wounds occasioned by the fire of an enemy and those voluntarily inflicted, and consequently they reported that there was no satisfactory proof that the soldiers under examination had mutilated themselves.

This was one of those memorable occasions on which Larrey gave to his profession a noble example of that independence of spirit and firmness of purpose which, although in the first instance offensive to Napoleon, ultimately tended to raise the character of the surgeon high in the estimation of the Emperor. After a stormy interview, in which it would appear that Buonaparte had prejudged the case, and seemed to expect that the surgeon should make his report in conformity thereto, he suddenly altered his tone and said, Adieu! Monsieur Larrey, a sovereign is happy in having to deal with such a man as you!—sending him, in the course of the same evening a present of 6000 francs, and an order for an annuity from the state of 3000. The details of this characteristic interview are given in an interesting work entitled "Napoleon et ses Contemporains," along with a print of the scene taken from a picture, which the Baron showed me when in Paris several years ago, and which no doubt remains in possession of his family.

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